UNIVERSITY OF PECS
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SUCCESS FACTORS FOR DISTANT HIGH-TECH START-UPS BASED ON THE ISRAELI EXPERIENCE

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Abstract

Israel is a young and small country developing under complex circumstances. It is fighting for peace and security while being surrounded by hostile countries. A keystone to ensure its survival and prosperity is its economic success. Israel fosters a culture which promotes knowledge rich new technologies and acknowledges that a main engine of the economical development is the high-tech sector. While the importance of new business for the economic growth is widely recognized, the role of new exporting high-tech ventures based on state of the art technologies and geared towards profitable export of high value products seem to offer a sound mechanism on the road to achieve economic independence.

Cultivating a high-tech start-up until it develops into a mature and successful company is a great challenge even in the biggest and most developed countries. The collapse of the NASDAQ and many high-tech ventures at the beginning of the century, accompanied by an economical recession, has just exacerbated the situation. With Israel's unique circumstances and geographical isolation from its main export markets the challenge becomes even greater.

Until today researchers studying the success of high-tech start-ups focused mainly on specific subjects such as the entrepreneur, technology, marketing and other such aspects. There is no study that has concentrated on a comprehensive model with the unique aspects associated to Israel. This country is characterized by the combination of a small economy, sparse natural resources but high concentration of educated labor. The small internal market and the dependence on overseas markets generate exceptional challenges to the high-tech industry. Thus the main question in this study becomes the possibility to develop a comprehensive model to assist entrepreneurs and leading personal in the high-tech start-up sector to improve the chances for success and contribute to the entire economy. The study explores the main issues concerning the success factors of high-tech start-ups and is based on the experience of Israeli companies.

The research is based on a multiple stage methodology. The initial phase was a literature review to derive a list of topics and their main parameters deemed relevant for success. Then 14 in depth personal interviews, with leading persons in the high-tech start-up community were conducted. The collected data was the basis to the identification of apparently main topics and their relevant parameters that influence a high-tech start-up success (with emphasize on Israeli start-ups) and the construction of a provisional

model. An initial questionnaire reflecting the model was utilized in a personal pilot survey with a diverse start-up and experts' population. The purpose was to establish reliability, insert necessary additional questions and changes to overcome any lack of clarity and ambiguity. The final questionnaire included many open ended questions to obtain different responses and to enquire about major issues that could not be implemented in closed questions. It was replied by 79 responses from 69 start-up managers and 10 experts (investors and consultants). The respondents ranked all the subjects and parameters and enabled verifying the validity of the model while highlighting the issues of notable importance and the parameters which are identified as having little influence on the success chances of an Israeli high-tech start-up. The last phase of the research applied a model validation process which approved the results of the research model.

The data analysis shows that the 15 identified topics can be divided into two main categories. Those of the highest importance to achieve success and those which are less critical. The first group includes eight topics, Core Team Commitment, Core Team Expertise, Idea, Strategy, Marketing Strategy, Customer Relations, Management and R&D Capacity. The group with those seen as less critical topics includes Networking, Funding type, Economy, Complete product, Organization, General environment and Politics. There is also a considerable variation in the ranking of parameters within a few of the topics. The analysis' results were employed to construct a practical model for comparison, application and use for nascent and growing high-tech start-up enterprises based on the Israeli experience.

The resulting research model including the topics and parameters influencing success of high-tech start-ups is derived from extensive literature and vast real-life experience of many Israeli leading persons in this field. Hence it is well established in experience and knowledge and should have a very practical utility. The application of the model may enable new firms to identify and perform an assessment of their capacities and thus to change, modify, amend or to acquire required capabilities to improve their venture prospects for success. Although the model is based on the Israeli environment and experience, many other countries geographically isolated from their main markets share numerous of these characteristics, and may find the value in adapting and applying this model.

Chapter 1 - Introduction

Whilst the importance of new business for economic development is widely acknowledged, the role of new exporting high-tech business in Israel is seen as vital. Israel is small and geographically isolated from the main markets, suffers from security difficulties, but fosters a culture which promotes knowledge rich new technologies. Thus, new ventures with leading edge technologies and prospects of high growth and profitability offer a means to achieve the national goal of economical independence.

High-tech in general and high-tech start-ups in particular becomes a major factor influencing the world economy. Tadmor (1997) argues that for the last two centuries science and technology have merged into a new invisible entity, which is launching a new scientific-technological revolution. This revolution is the mother of all high-tech industry and will control the new world of the 21st century. This process will determine the economic destiny of all nations in the world. Only countries that possess technological, as well as scientific ability will be entitled to enter this club.

Internationally however, the high-technology sector has recently suffered badly from the bursting of the dot.com bubble and the crash of the NASDAQ. Prior to the collapse, the remarkable exuberance for new high-technology ventures was leading to quite unrealistic expectations about the profitability and sustainability of many of these new companies. A characteristic of companies formed during the overheated period was the elevation of ideas over substance and in particular, the lack of a sound business model. In addition to the negative climate for new businesses, all new high-technology companies also face general problems in their liability of newness and particular problems associated with creating new products employing high-technology. The technologies are often developing; applications may be unclear and the markets not yet established. Consequently it became progressively more difficult to establish, both in Israel and elsewhere, successful new high-technology companies. Nonetheless, there is recognition about the potential value of these high-technology companies and some evidence of their gradual re-emergence under difficult circumstances alongside with some positive signs of economical recovery from its downturn that started with the NASDAQ crash in 2000.

Current literature offers very little empirical evidence and sound theoretical holistic frameworks that explore the success of high-tech start-ups in

general and even less for those who need to start the business with a global approach. This study addresses the issue of a viable business model which could enhance the start-up companies' prospects of success. Since most of the aspects which are dealt in this research are valid to any high-tech start-up and primarily to those emerging within small economies remote from their main market, such a tool can be useful to the start-up community in many different parts of the world.

This chapter provides the background of the research. The chapter begins with explaining the definitions of high-tech industries and high-tech start-ups. It continues with description of the Israeli economy and the impact of the high-tech industry and start-ups on the global and Israeli economy. Following the thesis presents the effect of the military service and defense industry on the high-tech industry and the Israeli entrepreneurial character accompanied with an example of a holding company, RDC, exploiting defense technology into commercial enterprises. Chapter 1 continues by articulating the necessary aspect of funding and presentation of the basic research fields. It concludes with the research objectives, the research framework and a summary of the research foundation leading to the research hypothesis. Chapter 2 establishes the theoretical framework of the research. It commences with a basic model describing the fundamental domains affecting high-tech companies and reviews the literature to identify all elements deemed to be relevant for the success of high-tech start-ups. It continues with an infrastructure analysis, based on Porter's diamond model while analyzing a sound representative of the Israeli high-tech industry, the electronics industry. Chapter 2 concludes with an expanded model derived from the topics exposed during the literature review. The following chapters deal with the primary research. Chapter 3 depicts the research methodology and chapter 4 the research findings with all the research empirical and statistical analysis. The thesis concludes with chapter 5 which comprises the summary of the empirical analysis including the final research model and chapter 6 containing the conclusions and recommendations.

1.1 The high-tech Industry

"High-tech" does not have a universally accepted definition and there is no apparent list of industries regarded as high-tech. Most high-tech industry classifications have common elements, yet may vary significantly in scope (Incontext, 2000). A high-tech industry has been defined as one whose business activities are heavily dependent upon innovation in science and technology (Medcof, 1999). The degree of radical innovation in the firm has been identified as a measure of high-technology. This is evidenced by a

radically new product or process that is introduced to the market with a first-mover advantage (Ali, 1994). Nonetheless defining high-technology industries has been the subject of debate (Oakey, Rothwell and Cooper, 1988). However, a consensus amongst descriptions of high-tech supports the importance of these industries. High-tech ventures invest more heavily in R&D activities than the national average, employ a higher percentage of engineers and scientists among their staff, offer technologically advanced products, typically with complex designs and configurations, are dynamic in nature and have short product development cycles (Oakey et al., 1988; Covin and Slevin, 1991). Reeble (1990) defines high-tech industries as those that engage in activities with high rates of change, high levels of research and development expenditures and innovative products. Medcof (1999) offers the following criteria to define a high-tech venture:
I. Research intensity (ratio of R&D expenditures to sales); II. Total R&D expenditures; III. Sales growth.

Some of the other common definitions of high-tech are not very different. Rexroad (1988) defines high-tech as the segment of technology considered to be nearer to the leading edge or the state of the art of a particular field. According to Grunewald and Vernon (1988) high-tech comprises of the devices, procedures, techniques, or sciences that are characterized by state of the art development and have typically short and volatile lives.

Classification developed by different organizations and the US Bureau of Labor Statistics mention the following attributes as related to high-tech:

- Industries with the greatest growth potential;
- Based on the nature of the product rather than the process;
- Both high-tech products and processes reflect the highest concentration of technology-based occupations.

Paragraph 1.2 describes the definitions of high-tech products and start-up firms.

1.2 High-tech start-up products and firms

High-tech products and start-up enterprises have several definitions. For clarification the author presents some of the relevant definitions.

- **High-tech products**

Gardner (1990a) proposes a 3*3 matrix as the basis for classifying high-tech products as well as providing a guide for marketing strategy. Table 1 describes the matrix. Cell 9 1 defines the most high-tech products, which Christensen (1997) describes as disruptive technology, while products in cells 6 and 8 being categorized as slightly less but still belonging to the

group of high-tech products. (The examples are valid for the time Gardner's article was written).

The user dimension →

Technology dimension ↓

	Continuous	**Dynamically continuous**	**Discontinuous**
Stable	1 "New" snack food	2 Frozen pizza	3 Major software change
Fertile/ Evolutionary	4 Upgrade PC Software	5 Fax, desktop publishing	6 Internet communications
Turbulent	7 Genetically engineered	8 High definition TV	9 Paperless banking

Table 1: Technology/user-based product classification and examples

Diffusion of new and innovative products

The high-tech industry is highly involved in innovation and development of innovative products. The takeoff of new products is a vitally important phenomenon in the management of new products (Golder and Tellis, 1977). It is characterized by an initial period of slow growth after commercialization that is finally followed by a sharp increase in sales (if the product is successful). The diffusion time and shape varies greatly between different products and depends on the level of innovation. (Mahajan, Muller and Bass, 1990; Golder and Tellis, 1997). The difference in time to take off can be partly explained by cultural and to a lesser extent economic factors. Takeoff occurs faster in countries that are more economically progressive. Higher need for achievement and industriousness and lower necessity to avoid uncertainty, increase the probability of take off (Tellis, Stremersch and Yin, 2003). Breakthrough technologies and innovative products have to consider the long diffusion time and should focus on the countries which are more receptive for new technologies and have a more affluent population.

- **High-tech firm**

A high-tech firm is defined as having a high-level of R&D expenditures, a relatively high percentage of scientific and technical personnel relative to total employment, sophisticated, innovative and high value added product or new technology for creating new products as well as for developing new markets (McCarthy, Spital and Launstein, 1987; National Scientific Foundation, 2000). Bolland and Hofer (1998) define high-tech firms as science-based businesses involved in the commercialization or the exploitation of innovation.

- **High-tech start-up enterprise**

Berry Orna in 1998, while serving as chief scientist at the Ministry of Trade and Industry in Israel, defined a start-up company as being high-tech R&D and export oriented, less than five years old, and whose accumulated sales volume for the last three years is less than six million US dollars. This is a subjective definition and one which changes with time and circumstances as explained at the end of this paragraph.
The Israeli definition relating to the R&D Law for Entitlement for Support of Industrial Research and Development (1995) is a beginning company, whose R&D plan is its first and only one. It does not have financing sources except for self-capitalization by entrepreneurs, and the research committee has recognized it as worthwhile for support.

McCarthy et al. (1987) differentiates between high-tech start-ups and general small businesses in two domains. High-tech start-ups unlike small businesses have broad and long-term business vision and play in fast changing and volatile markets. Some other aspects differentiating between high-tech start-ups and small businesses are the focus on growth, the use of innovative strategic practices and planning techniques and the human resources as a key element.

Some of the typical characteristics of high-tech start-ups which differentiate them from mature high-tech enterprises are: The young age (mostly between 0 to 10 years); the small and growing size; the low level of formalization; high level of centralization; low number of organizational levels; simple and functional structure, small and evolving specialization and high degree of delegation in the level of job responsibilities.

- **High-tech start-up enterprise definitions for this research**

This thesis author concludes that the best fit for the purpose of this research is probably to define an Israeli High-tech start-up as a combination of definitions:

> *A high-tech start-up enterprise is a young entity, engaged in the commercialization of its high degree of technologically based innovation. The enterprise seeks to establish a solid strategy, is globally oriented, has major goals of rapid growth and of becoming a large entity. It operates with a high degree of flexibility and a dynamic structure.*

The term "young entity" does not specify an accurate quantity. It is used since a start-up that was not acquired, or did not manage to make an IPO in

3-4 years under conditions of a booming economy of the late 90s, was terminated. In today's economy the investors continue to fund the start-up for longer periods if they believe that the main reason it did not erupt is due to the slow economy. In this case a start-up can last up to ten years (and in some circumstances even longer).

1.3 The Israeli economy

A number of authors have commented on the dramatic changes in the Israeli economy over the last two decades (Dvir and Tishler, 1999; Lerner and Avrahami, 1999; Azulay, Lerner and Tishler, 2000; Israeli Ministry of finance-International Division, 2003; Israeli Ministry of finance - Economic and Research Department, 2003). Some salient characteristics of these changes are:

- The Israeli market has opened up to foreign competition and international investments;
- A considerable wave of immigration, primarily from Russia, with many educated people in fields of science and technology has been absorbed;
- Government and private support in know-how infrastructure has increased;
- Shrinkage of the defense industry - the traditional main driver in the development of the Israeli high-tech industry;
- Education level has continued its positive trend primarily by the establishment of many new colleges;
- The changing lifestyle of the young generation and the computer era have attracted many youngsters into the computer science, electronics and IT fields;
- The high-tech industry has raised more capital than any other sector in Israel.

As a result of the cold war termination and geo-political changes in the Middle East during the last two decades, highly educated and skilled personnel transferred from the defense market into civilian high-tech industries (Frenkel, Shefer and Roper, 2003). This encouraged a remarkable growth in numbers of emerging high-tech start-ups and in their level of contribution to the Israeli economy described in paragraph 1.3.2.

1.3.1 Global start-up activity and its economic role

The start-up ventures, which are recently receiving a high degree of attention, are not a new phenomenon. Some of the largest international high-tech organizations today were no more than fledgling, barely surviving, enterprises more than a century ago. Edison Electric CEO

promised in the 19th century to light up New York in perpetual daylight. The company could fulfill its promise only after a series of mergers and acquisitions and management reshuffling led to its becoming the legendary technological General Electric conglomerate. Microsoft and Bell are well-known examples among many other such companies.

When considering the role of small size firms in recent era, a series of empirical studies (Loveman and Sengenberger, 1991; Acs and Audretsch, 1993) have uncovered two systematic findings regarding the response of the industrial structure to changes in the underlying determinants. The first is that the industrial structure is generally shifting towards an increased role for small enterprises. The second is that the extent and timing of this shift is anything but identical across countries. Rather, the shift in industrial structure towards a greater role for small-medium enterprises (SME) has been heterogeneous and apparently shaped by country-specific factors (Audretsch and Thurik, 2001).

The extensive literature, which analyzes the impact of entrepreneurship on economic performance, typically measures economic performance in terms of enterprise growth and survival (Audretsch, 1995; Caves, 1998). The fact emerging from this literature is that entrepreneurial activity is positively related to growth. The growth rate of new firms and small firms is systematically greater than for large and established incumbents (Roberts, 1991a). Roberts (1991a) suggests that based on the empirical findings, there is evidence for a positive correlation between countries that have experienced an increased role of entrepreneurial activity and higher rates of subsequent growth. The Global Entrepreneurship Monitor - GEM report of 2003 similarly states that there is a statistically significant positive association between national economic growth and national level of entrepreneurship. Carre and Thurik (1997) as well as Audretsch, Carree, van Stel and Thurik (2000) also find that there has been a reward in terms of economic growth for countries that have gained a greater share of smaller firms. Lerner and Avrahami (1999, 2002) in their Global Entrepreneurship Monitor (GEM) study of Israel conclude that in Israel there is a strong relationship between entrepreneurial activities, defined as start-up activities, and economic growth, but they mention that data collection has been too brief to determine causal mechanism. The above mentioned studies support the notion that start-up entrepreneurship constitutes a most important factor for economic growth.

Entrepreneurial ventures account for 65% of the employment growth in the US in recent years (Lyon, Lumpkin and Dess, 2000). In 1996, $45 billion

were invested in the start-up sector in the USA (about one third of private investment in the high-tech industry). During the years 1980-1997, high-tech production in the USA increased at an average annual rate of nearly 6.2% compared with a rate of 2.7% for other manufactured goods. (NSF, 2000). In 2000, investments reached $68.8 billion despite the collapse of the NASDAQ (Price Waterhouse, 2001).

Although small in number compared to other types of firms, high-tech ventures generate a disproportionate share of the wealth and jobs created. Early economists like Schumpeter (1934) and Solow (1970), as well as others have recognized the importance of innovation as catalyzing markets and creating economic growth. More recently focus has been on technology as the primary force behind the rising standards of living (Grossman and Helpman, 1994). Tapscott (1996) argues that many believe that technological innovation will determine the success of nations in the future. In summary it seems to be clear that high-tech ventures are a primary driver of the new economy and its level of growth.

1.3.2 High-tech impact on the Israeli economy

> ***"Only minutes from the world's most revered religious and historical sites, a high-tech environment that many observers consider unparalleled in brain power and opportunity has emerged in Israel. While many companies are just beginning to sell product, they already are seeking solution provider partners in the US, the biggest markets for their product."***
>
> *Hausman, 2000*

Together with the USA and Canada, Israel was leading the global indices for the level of entrepreneurship, indicating the average business rate per 10,000 population. The level is 6.9 compared to 3.4 in Italy and Great Britain and 1.8 in Japan, France, Germany, Finland and Denmark (Lerner and Avrahami, 1999). Recent results (GEM report of 2004) show that the average business rate of Israel during 2000-2004 decreased a little to 6.6 below the average of 9.4 (positively skewed by poor countries such as Peru and Ecuador who have a high level of necessity entrepreneurship) of the 34 participating countries but is still ahead of developed countries such as Great Britain, The Netherlands, Germany, France, Finland and much bigger than Japan.

For the past ten years, public policy and private initiative stimulated impressive growth rates in high-tech entrepreneurship in Israel. The explosive growth of Israel's high-tech sector has attracted widespread attention. For example, in its survey of VC firms, Wired Magazine (July

2000) placed Israel in the top four of the world's high-technology hot spots - one lower than Silicon Valley, on a par with Boston and Stockholm, and ahead of London, Helsinki and Bangalore.

Intel, Microsoft, IBM and Motorola are just few of the international conglomerates that have established very successful R&D and even manufacturing centers in Israel. Overseas investment in Israel has soared tremendously in recent years. In 1994 it amounted to $26 million and by 2000 twenty Israeli companies were procured by foreigners for more than $10 billion. Many of the major Silicon Valley VCs are actively pursuing Israel's opportunities some by direct investment and some by investment via Israeli VCs.

The Israeli technological market today is developed and diverse. High-tech is energizing Israeli industry and became a major power in the Israeli economy. Its growth rate is the highest of all industrial sectors. During the first half of 2000 the high-tech growth rate was 12%, while the conventional industry growth rate was only 2% (Haaretz newspaper, 29.6.00). At the end of 2000, high-tech export, amounting to $15 billion, contributed 74% of the total industrial export and a third of the entire export volume. Israel's high-tech export doubled from 1990 to 1996 in contrast to 10% growth of the low-tech sector. The high-tech contribution to the GNP growth is about 75% while the high-tech enterprises provides 36% to the GNP (Israel Central Bureau of Statistics – ICBS, 2001)

In the decade from 1990-2000, the high-tech portion in the total Israeli GNP multiplied by 2.6, from 8% to 21% in 2000 and manpower tripled, while export high-tech volume grew by a factor of 18. In 2001 and 2002, although high-tech was in deep crisis, it still contributed about 50% of the Israeli export (Israel Export Institute, 2002).

In human capital, Israel has a high number of scientists and engineers as a proportion of the population. Business Week (3/2/97) reports on the unusually high concentration of skilled professionals. Israel has approximately 130 scientists and engineers for every 10,000 workers. This compares with 80 and 75 in the U.S. and Japan, respectively. At 3.5%, it has the greatest R&D expenditure in the world as a percentage of GDP (Traston et al, 2002) and the highest number of start-ups in the world in relation to the population size.

Leading high-tech companies in Israel, like Check Point, Amdox and Comverse, embarked on their journey just about a decade ago as newly

established start-ups. Such companies today make a significant contribution to the Israeli economy.

High-tech start-up ventures are no doubt a significant global trend enjoying a substantial momentum in Israel during the last two decades. The military service and the defense technology have a foremost impact on the development of the Israeli high-tech industry. Some aspects of this influence are described in the next paragraph.

1.4 Military technology as the driver of the Israeli high-tech Industry

Military technology has become a driver of the Israeli defense high-tech industry and was instrumental in transforming Israel's civilian industry into a successful high-tech industry. The defense sector is still a very important source of new technological know-how and experienced human resource for the civilian high-tech industry (Dvir and Tishler, 1999). The Six-Day War in 1967 and the ensuing French embargo on the export of military equipment to Israel offered an extra boost to the development of the high-tech sector in Israel and encouraged the development of the electronics industry in the 1970s. The Israel's strategic policy shifted towards massive domestic development of a sophisticated military industry alongside development of a scientific and technological infrastructure, which would promote civilian industrial development (Frenkel et al., 2003).

Probably no one person was more responsible for the development of Israeli high-tech and the commercialization of defense technologies for civilian products than Uzia Galil, chairman and CEO of the holding company Elron Electronic Industries. Levav (1998) succinctly describes the biography of Uzia Galil, who is known as "the founding father of Israeli high-tech" Elron, a stable of some 20 high-tech companies with a market cap of $500 million. In the mid-l950's Galil spent several years studying at US universities and saw there how American companies were turning military technologies and scientific know-how into saleable products. Returning to Israel in the early 1960s he created Elron Electronics Industries from his small apartment in Haifa and turned it into a multinational holding company which spin off companies such as Elbit (military computers), Elscint (medical imaging), and Optrotech (automatic inspection of Printed Circuit Boards). It was people like Galil along with private companies such as ECI Telecom, Tadiran and El-Op who led the export drive in military products and the strengthening of the defense industries. According to Nisso Cohen (in an interview 2002), founder of International Data Corporation Israel and one of the leading opinion-makers on Israeli high-tech, "Demand for Israeli 'proven in battle' products

led to an export industry of defense-related products which, to this day, comprises a large percentage of Israeli high-tech exports."

In Israel, the IDF serves as a magnet for the Israeli economy and high-tech environment drawing together the best people from industry, academia and the R&D institutions. The source of most secrets that enable the Israeli high-tech breakthrough is the defense organization – from both, the development of warfare systems and from the intelligence branch. The 50 years of battle generate problems, such as needs for electro-optical systems, radar systems and communication means. The necessity to find optimal solutions to all the problems, taking in account constraints such as a short time frame, forced Israelis to work modes other than the traditional ones used in the technological-scientific world, i.e., under much greater stress – and thus produced great achievements.

The radical changes in the defense forces structure and the defense budget had yielded efforts to convert military technology into commercial application.

1.4.1 Military technology conversion

Since the end of the cold war military spending was cut drastically, forcing defense organizations to seriously consider civilian implementations of their technologies. World military spending reached $740 billion in 1997, 40% less than its peak in 1987 (Skons, Allebeck, Loose-Weintraub and Weidacher, 1998). Several strategies have been taken by the defense firms in order to adjust to this changing environment (Markusen, 1998; Dvir and Tishler, 1999). Conversion of military/defense technology, in which existing defense know-how and technology are used to develop and manufacture products targeted to the civilian markets, is one of these strategies (Dvir et al. 1997; Hougi, Shenhar, Dvir, Tishler and Sharan, 1998; Susman and O'Keefe, 1999). Such efforts can be executed in several ways, such as corporate entrepreneurship, acquisitions of companies and establishment of spin-off companies. Azulay et al. (2000) examine the relationship between entrepreneurial behavior of employees and defense conversion in an Israeli large defense organization. They conclude that entrepreneurial efforts mostly yielded more new ideas aimed at the defense-related areas. A major reason identified for this phenomena, is that employees did not feel a strong commitment of the top management to defense conversion and its importance to their organization success.

Dvir et. al. (1997) summarize their research by stating that Israeli defense organizations did not succeed in commercializing military technology

primarily because of the organizational culture prevailing in these organizations. The organizations did not act according to basic principles necessary for civilian, commercial markets, particularly in the organizational and marketing domains.

Despite the fact that most of the experience to use/convert military technology to the civilian market failed, there is not much data nor methodical research regarding these attempts. Analysis of successful military conversion cases in the USA (Dankanyin, 1994), indicates that for successfully commercializing military technology the following steps are essential:

- Establishing a separate and independent business unit for the new commercial market;
- Changing the company management construction to enable the business unit autonomous decision-making process;
- Wide usage of operational teams, networking and total quality assurance;
- Utilizing market research to validate the existence of substantial demand for the product/service in development;
- Execution of adequate techniques for expeditious implementation of a prototype to quickly reach the market;
- Exploitation of a short run window of opportunity;
- Establishing corporations with leading organizations in areas in which the company does not have a relative advantage.

Similar results have been found in studies performed by Page (1993, 1995) examining the factors influencing successful decentralization of large companies in the domain of commercialization of defense products and services. The strong influence of the defense industry on the high-tech industry has had also its effect on the start-up community. Since Intrapreneurship to commercialize defense technologies was not very successful (Dvir et al., 1997; Hougi et al., 1998; Dvir and Tishler, 1999) other means had to be explored. The other way is to identify the attractive technologies and commercialize them as spin outs in newly established start-ups. Although spin outs seems to be a viable method for commercialization of military technology and constitute a practical tool to create new ventures, it is not a common phenomena in Israel. Even the Technion (the Israeli MIT) does not have a model of spin outs. The start-up enterprises in the Technion high-tech incubator enjoy primarily informal ties with the Technion staff but not a spin out activity and even little real formal collaboration. (Rothschild and Darr, 2005). Most of the start-ups created in Israel in the last decade are by private initiative supported by angels and VC funds. Because of the strong

influence of military technology on the high-tech industry the author selected to describe an example of a holding company executing a unique framework for commercialization of defense technology, but not to elaborate on spin out models. I shortly discuss the model selected by Rafael, a leading defense organization in Israel, which has developed a unique spin out framework. Rafael started with Galram and later established RDC. The description is based on data accumulated during interviews with Galram and RDC managers and internal unpublished sources of these organizations.

1.4.2 Rafael Development Company (RDC)

Rafael had tried commercialization efforts in the late 80's by forming a technology holding company as a subsidiary of Rafael named Galram. Internal sources explain that the company was rather unsuccessful due to lack of capital, Processes, environment and infrastructure unsuitable for the civilian market. The second phase of the efforts involved the establishment of Rafael Development Company - RDC in 1993. The main changes in the new model included involvement of an experienced commercial investment company providing adequate funding and valuable business assistance and networks; operating in a separate location enabling the creation of a completely new environment and culture; selecting a CEO with civilian market experience containing leadership, vision and enthusiasm.

RDC identifies technological opportunities within Rafael. The relevant entrepreneur receives an initial budget to write a business plan in four to five months, and an R&D committee including RDC and outside professional consultants decides whether to commission a more formal feasibility study; If accepted some seed money is granted to establish a venture; portfolio companies share knowledge and experience.

RDC's greatest success, so far, is Given Imaging which is in the capsule endoscope field. The company was established in 1998, started sales in 2001 and is profitable since 2004. The high growth rate of this company brings its value to over $800 million.

RDC's former CEO, Reuben Krupic, believes that for high-tech start-ups the most important business function is "management" while the most important activity to succeed is "teaming". The company's current President and CEO, Reuven Baron, added some of his thoughts and opinions in an interview in February 2004. The reason that Rafael is an outstanding source for identifying technologies, which can be converted into commercial products, is Rafael's high diversity of technologies, its mature methodologies of product development and their conversion to

applicable products. Rafael technologists must have the support of experienced business managers who think commercially. The uniqueness and main advantages of being an RDC start-up in Reuven's view are:

- The professional assistance in critical nascent stages (Pre-seed and seed stages), which is not available from VC companies, and the professional escort of RDC staff until successful exit of the star-up;
- The investors' vast business and marketing experience and their involvement in the business development of the start-ups;
- RDC's close contacts with the world of finance.

RDC companies are part of this research, but because of their limited number it is not possible to make a comparison to other (non RDC) start-ups and identify differences or draw any definite conclusions.

Israelis are conceived as having proficient improvisation capabilities. The next paragraph clarifies the perceived relation to the compulsory military service of Israeli men and women.

1.4.3 The Israeli unique improvisation capability

Kalish, the founder of Jerusalem Global Innovation Centers, one of Israel's premier VC funds, says that when one is in the military, one becomes good at improvising. For this reason, Israel's high-tech industry is dominated by former intelligence personnel and combat fighters. The Israeli military, has served as the incubator for a generation of hugely successful start-ups, many of which use derivatives of classified defense technology and now trade on the NASDAQ. The Israeli army present enormous responsibility to relatively junior officers and encourages them to use their guile and ingenuity to solve problems. The chain of command is lean, unstructured and goal oriented, more typical to a start-up than a military bureaucracy. According to Joseph Vardi, director of International Technologies and a dean of Israel's high-tech sector, a generation of war forced Israelis to take risks and think out of the box. This is the reason the army teaches 20-year-old kids to run $30 million companies.

Friendly Robotics, as a classic example of an Israeli start-up, was launched by Udi Peless, a retired pilot, together with former intelligence officer Shai Abramson. The company makes smart home appliances, including RoboMow, a robotized lawn mower. Friendly's research team consists of former intelligence people, with retired combat veterans doing the marketing and management. Peles affirms that the technology behind RoboMow is based on military applications. The development was not all smooth going since a range of scenarios involving different topographies

and shape of lawn had to be considered. The research team and management work in a way very similar to that customary in the air force. The intelligence side identifies the threat, and the pilots act on it.

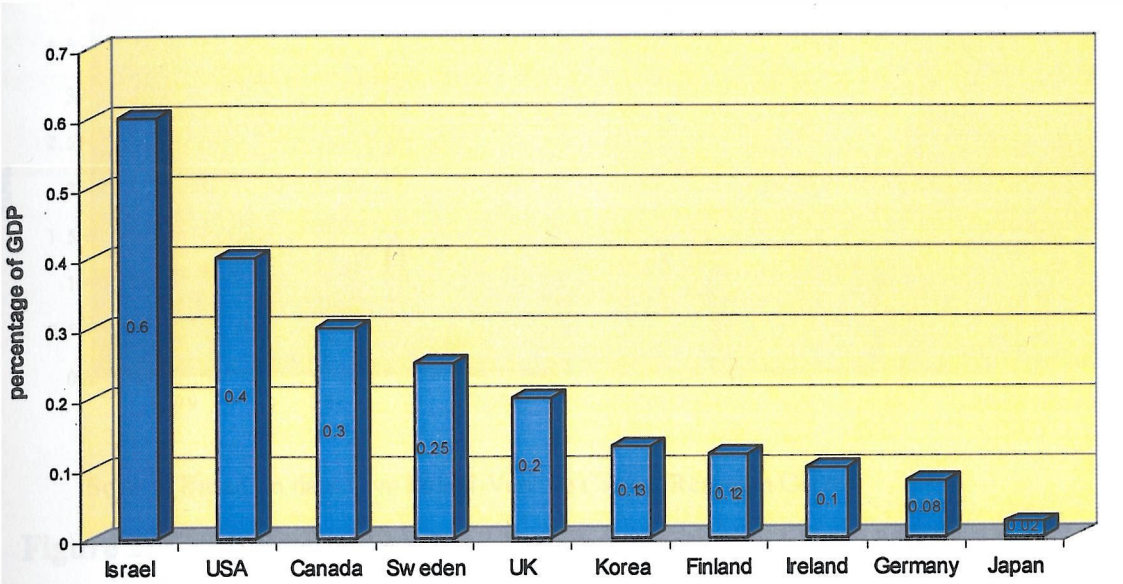
A major element for survivability of a start-up is to obtain sufficient finance until it achieves success in the markets and creates profits. The next paragraph deals with the changes in funding resources from the past to the present.

1.4.4 Start-up financial resources and economy effect

High-tech entrepreneurs who started their start-up activity in Israel dozens of years ago raised funds from other companies, from informal sources as family and friends and from own sources. Large investing organizations such as the banking industry do no tend to invest in high risk undertakings such as high-tech start-ups. During those days there was a lack of funding sources to expand the high-tech entrepreneurship into nascent activities which are not internal or connected to a mother company. Today investors in high-tech companies and start-ups are much more established and the potential resources are versatile. Angels and Venture Capital (VC) are among the new type of investors heavily involved in high-tech start-ups. These two types invest primarily in the first stages of the venture before it performs an exit.

During 1992, there was only a single Venture Capital (VC) company in Israel managing $30 million. At the beginning of 2001, Israel had more than 4000 start-up companies, with more than 100 VC companies, which succeeded in raising $2.4 billion in 2000 (Dolev and Abramovitz, 2001). GEM (2003) shows that the proportion of VCs investment in Israel (the highest among GEM countries) amounts 35% of the total investments.

One of the most striking indicators of the substantial role of high-tech is the international comparison of Venture Capital investment in high-tech companies. Figure 1 shows this investment of VCs funds in high-tech firms as percentage of GDP in several developed countries during 1999-2002. It clearly demonstrates that internationally, Israel has the highest rate of VC investments in the high-tech sector at 0.6% of the GDP. This investment level is 50% higher than the US, three times as much as the UK and manifolds that of countries such as Germany and Japan.

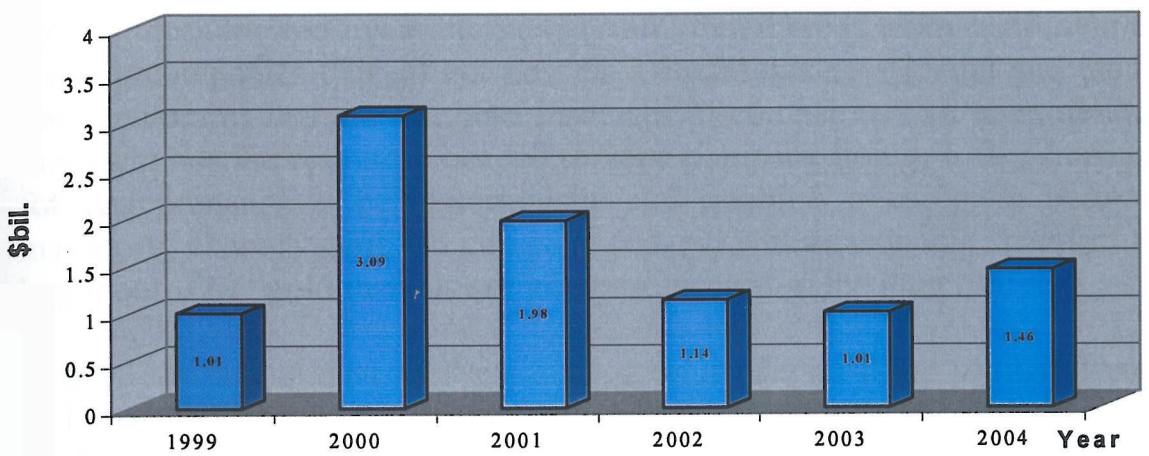


Source: Based on data from Israeli Export Institute

Figure 1: Venture Capital Investment in high-tech as a percentage of GDP, 1999-2002

The money invested in seed companies returned during 2003 to the level of 6% of the total annual investment in high-tech start-ups ($58 million) after declining from 9% in 2000 - almost $300 million, to about 2% - only $23 million in 2002.

An indicator of the volume of investment in high-tech and an apparent return of investor confidence can be seen in figure no. 2 which depicts the capital raised by high-tech companies in Israel, each year during 1999-2004 (Israeli Venture Capital - IVC, 2005). The peak of above $3 billion in 2000 and the following decline in the following three years are highly observable. The positive trend started at the second half of 2003. IVC website describes that Israeli venture market continued to develop favorably in 2004. Over the year, 428 high-tech Israeli companies raised $1.46 billion from local and foreign venture investors, a 45 percent increase from $1.01 billion raised in 2003. Zeev Holtzman, Chairman of IVC Research Center and Giza Venture Capital, noted that "2004 was characterized by a return to full-scale activity in Israel's high-tech sector, from depressed 2001-2003 levels. Israel is a global technology and innovation center that keeps attracting international investors, foreign VCs and multinational corporations".



Source: Based on data from Israeli Venture Capital Research Centre

Figure 2: Capital raised by Israeli high-tech companies, 2000-2004

In is noteworthy that although the Communications sector continues to attract the highest sums, its relative share is decreasing (29% in 2004, compared to 37% in 2002) while the Life Sciences sectors increases its share steadily (22% share in 2004 up from 8% in 2000). After three dismal years seed companies were relatively successful in 2004, as 54 seed companies attracted $108 million - 8 percent of the total capital raised, almost twice the $58 million (6 percent) of 2003.

The second half of the 1990s introduced a new aspect to the high-tech industry. Start-up companies that had not made sales even for a penny have been evaluated in hundreds of millions of dollars and sometimes in billions of dollars. The start-up companies' value was based on theoretical, and sometimes imaginative, market potential mostly far from any reality. This period of inflated values, the so-called new economy, was also dubbed the "Bubble". The "Bubble" period had a great effect on Israeli high-tech and primarily on the start-up venture. The surplus of funds and the desire for quick investment in order not to miss the new era yielded thousands of new high-tech enterprises in Israel. In 2000 the inflated NASDAQ crashed and was consequently dragging the entire global economy. The ensuing collapse of many start-ups even worsened the economic situation, and the start-up community and their investors had to return to the old economy, measuring the business in terms of sales, revenue, cash flow, profit and return on investment.

Gil Shwed, CheckPoint's CEO and Israel's most successful entrepreneur of the past decade, said in an interview (2002) that there is a large inflation of start-up companies that do not possess a sound business model and many young ventures that are all those instances of companies that have neither the talent nor the resources needed to get a company going. It is ridiculous for entrepreneurs to be opportunistic and establish a company because maybe, by chance, some US company will get enthusiastic and 'happen' to buy it out. The "gold rush" is not going to succeed in the long run.

In 2003 the economical recovery started, while the resulting positive trend of investments in high- tech start-up continued in 2004. The lessons from the "bubble" era were partially assimilated and the industry has returned to real economy measures. After three challenging years the successful high-tech start-up companies are emerging with growing sales, and sound profits and public offerings of some (even strongly hit dot.com companies) are emerging again. Joseph Vardi, an Israeli worldwide Internet guru (who sold his start-up "Mirabilis" for more than $400 million), said in an interview in September 2003 that the need for high-tech products such as broadband communications, digital cameras and Internet applications, is continuously growing. There was an element of alienation between the stock market and the industry, starting with the "Bubble" of 1997-2000 to the "deep" (the dive) of 2000-2003. We are now reaching the equilibrium period. The opportunistic investors left the market and we are back "down to earth".

The research is largely motivated by the fast pace of the technological revolution in the last decade (1990-2000) and the renewed tempo at the end of 2003 and early 2004, which have inspired the emergence of many high-tech start-up companies. The fast recovery proves undoubtedly that the high-tech start-ups are not a fad but a meaningful phenomenon affecting the global economy. The high-tech start-ups in Israel are returning to the centre stage and will strongly affect the destiny of its economy.

The security situation in Israel and the slow global economy have apparently a strong influence on the Israeli economy, which largely depends on the inflow of investment funds. The collapse of the high-tech in 2000 significantly reduced the volume of investments in the Israeli high-tech in general and in the start-up sector in particular. Rolnik (2003) discusses the fifth largest economy, that of California and raises the debate that as the Silicon Valley decline has had a strong influence on California's economy there is no wonder that the troublesome high-tech era has a strong influence on the Israeli economy.

The worldwide competition in high-tech is intense and continually increasing. Some newcomers from the Far East and Eastern Europe have recently joined the high-tech race. As an example it is worthwhile mentioning China's growing power. China enjoys a tremendous economic growth (more than 10% growth of GDP and export of goods and services per annum, since 1980) and enters the WTO (World Trade Organization) in 1999 (Nolan, 2001). Small scale private enterprises in China are the foundation for recent growth (Nolan, 2001; World Bank, 1998). Big foreign investments are poured into China for high-tech production, but that country is smart enough to promote its capability into high-tech R&D. The improved level of foreign investment in technological education and the still low cost of the workforce, position China as a main competitor in the high-tech industry and as a center for high-tech start-up ventures. The Chinese huge domestic market with already 263 million people using cellular phones can sustain its new technological ventures as a good start for growth.

Exploring the field of high-tech start-up ventures involves the integration of some basic domains. Those are shortly introduced below and further elaborated in chapter 2 which handles the literature review.

1.5 The research elements

The research is based on the convergence of two recent methodological developments

1. The appearance of the start-up enterprise as a valid domain of study (Gartner, 1985; Bygrave and Hofer, 1991; Cooper, Hornaday and Vesper, 1997; Lyon et al, 2000; Mcdougall and Oviatt, 2000; Shane and Venkatraman, 2000);
2. The developments in the field of high-tech marketing (Hisrich and Peters, 1978; Davidow, 1986; Meldrum, 1995; Viardot, 1995; Griffin and Hauser, 1996; Debelak, 1997; Burgel and Murray, 2000).

In reviewing the literature it appears that high-tech start-ups relate primarily to six different fields: Entrepreneurship, Business strategy, Marketing, Management, Finance and External environment. The following paragraphs introduce these domains. Although entrepreneurship is not a direct part of this study it is the source from which the start-up emanates and therefore discussed with some details. The other domains are introduced succinctly since the literature review in chapter 2 elaborates those subjects.

Entrepreneur and Entrepreneurship

A high-tech start-up venture is a specialized form of entrepreneurship, while notions of entrepreneur and entrepreneurship have many definitions.

The word "Yazam" meaning entrepreneur is relatively new in Hebrew. Formerly it was called "Independent" ("Atzmai" in Hebrew), closely related to self employed. When Israel was a young state many people were pushed into self-employment in order to support their families. Today in the developed country the term entrepreneur has the same meaning as in all other developed societies but has a high association with the high-tech start-ups sector into which people are pulled. An entrepreneur, according to the American Heritage Dictionary of the English Language (1992), is "A person who organizes, operates, and assumes the risk for a business venture". Entrepreneurship definitions have changed during the history, from the pre-classical Marco Polo type of transporting goods and up to the current and modern definitions. Those involve the following elements: processes coupled with opportunity recognition leading to creation of a new organization (Low and Abrahmson, 1977; Bygrave and Hofer, 1991; Van de Ven, 1992); the desire of individuals to generate, on their own or in teams within or outside existing organizations (Wennekers and Thurik, 1999); competing with other on the share of the market (Wennekers, Thurik and Buis, 1997); development of new ideas with resources one does not yet control (Gillin, 1998); marshalling of people and resources to create solutions to people's needs (Timmons, Smollen and Dinges, 1977); creating wealth and adding value (Kao, 1991).

My summary of the abovementioned definitions defines entrepreneurship as:

> *"A social process engaging development of new ideas while creating a new organization, accompanied by interactions among stakeholders and continuous changes, intended to solve market needs in a practical manner and to create wealth and added value."*

The following paragraph provides a short description of Business Strategy Marketing Management of high-tech, Economy, Finance and the Environment. The topics are further expanded in chapter 2.

Business strategy

The essence of the enterprise lies in its strategy. The strategy objective is to create a competitive advantage for the business. Many success factors relate directly to the strategy which influences all aspects of the start-up and hence its success.

In 1776 the philosopher Adam Smith established the expression of "complete advantage" to describe creation of advantage in commerce. The attempts to establish models explaining success in the market started even before the famous Schumpeter (1934) and continue with Levinson (1994) and others. But most of the models failed to provide a comprehensive explanation for the modern phenomenon of successful industries operating with a lack of necessary natural resources.

Johnson and Scholes (2001) define strategy as the long term direction and scope of the organization. The goal is to achieve advantage for the organization through its configuration of resources within a demanding environment, while meeting the needs of markets and fulfilling stakeholder expectations.

Marketing

High-tech start-ups have to take products to market in order to prosper or even survive. Given the small size of Israel's domestic market the urgent need to penetrate foreign markets creates a complex and challenging marketing effort. But a start-up has to consider that, to become a new international venture, it must build up resource positions that support future growth (Oviatt and McDougall, 1994).

Recent developments in the marketing literature provide an interesting insight into the entrepreneurial process. Some empirical studies capture a firm's capabilities to track market changes, such as competitor and consumer behavior, to help create new products and services. This market-driven capability, referred to as "market orientation" is defined as a firm's ability to track and respond to ongoing changes in the marketplace through intelligence generation and information dissemination activities (Jaworski and Kohli, 1993; Slater and Narver, 1999).

Without focused and effective marketing the start-up will not reach its customers. Great products are nice but do not necessarily lead to fulfillment. The concept of well defined targeted customers and marketing strategy for the future is important for any business and more so for a high-tech start-up fighting in a dynamic world. Sound marketing might be crucial for geographically distant located high-tech ventures requiring long arms to penetrate the target markets.

Management of high-tech start-up ventures

> ***"...New ventures are more likely to succeed to the extent that they: have sponsorship or capital; have managers with a range of experience in previous ventures; are given extra assistance of shelter; and can assure a high probability of passing all the hurdles faced by a new venture"***
>
> *Singer, 1995*

Dealing with high-tech means, being involved with an evolutionary and fast moving environment. According to Leonard-Barton (1992), at any given point in a corporation's history, core capabilities are evolving, and corporate survival depends upon successfully managing that evolution.

A typical situation to high-tech start-up founders is their R&D orientation and strong technological background. The CEO who is typically one of the founders contains one of the following characteristics:

- Has strong R&D experience but often lacks managerial experience;
- Is a youngster with very little experience (as was often the case in the end of the 90's "Bubble" era);
- Arrives from a large organization that has a different framework and behavior codes, and is inexperienced in start-up activities;
- Is a skilled manager with former involvement in start-up' activities.

Among other major duties management is also responsible to raise funds so crucial to enable the operation and survivability of a start-up company at its initial steps until it attains success.

Economy and Finance

The Israeli and the global economy have as well an effect on the chances of a start-up's success. When the economy is flourishing, there are many funds to support start-up ventures during their establishment and during difficult times. These funds come from different sources such as the government, angels and VC organizations. During periods of prosperity e.g. the late 1990s, start-ups are often procured by global companies that have the desire to acquire new technology and shorten the time to market of new products containing new and innovative ideas and technologies, in order to increase sales. When the economy declines (many times in concert with political struggle) the domestic budgets are reduced and foreign investors step out or reduce their involvement, creating a slow down in start-up investments (as shown in figure 2). The influence of the general economy is dealt with separately, as an external factor, although its direct effect on availability of funds is very obvious.

The high-tech industry sector is based on knowledge, and its products are primarily targeted to international markets, and therefore not strongly influenced by the regional situation. But Israel's security unrest increases the perceived risk in investments hence elevates the challenge to attract funds from foreign investors.

Environment

The environment includes all the subjects that affect the start-up prospect and progress but cannot be controlled by the start-up industry, such as the political situation, general environment aspects and the economy situation.

Some factors associated with the environment might have a strong influence on the start-up prospects. A few noteworthy examples are the risk associated with the unstable security situation and the small size of the domestic economy. The fluctuation in the economy and defense needs have a direct consequences on the government funds available for the development of necessary infrastructure and the direct financial and other assistance to the high-tech industry in general and start-ups in particular.

1.5.1 The research objective

The research explores the main issues concerning the activities of high-tech start-ups by investigating such firms located in Israel. A large part of these Israeli firms have roots in the defense industry. The association of the ventures with defense is either in terms of technology utilization emanating from development of defense related products, and/or in terms of employees' previous experience in the defense sector. As long as demand for military products was large enough, most Israeli R&D was dominated by large defense related companies. As this market shrank, development of additional industries and outlets was urgently needed. Thus room has been created for start-ups to flourish.

The purpose of this study is to provide an analysis of the factors influencing Israeli high-tech start-up success and suggest a framework leading to a model that Israeli and possibly other foreign start-up companies could follow in order to increase their success chances. Such a model of best practices, if properly grounded in the experiences of both successful and unsuccessful entrepreneurs, may provide a template to guide the formation and operation of new and growing high-tech companies. The contribution of this study is twofold, first to collate the experiences of practitioners and secondly, to synthesize these into a model which identifies critical factors and those factors which are important, but not deemed essential for success. The study aims to construct a practical tool for start-up leaders to use in order to be able to frequently evaluate their framework of concepts, assess

their enterprise' operating point and status, and perform necessary adaptations during the initial years of the start-up existence. The methodology utilized in this research in order to construct the model for success of Israeli high-tech start-ups is explained in Chapter 3.

1.6 The research framework and assumptions

High-technology start-up enterprises have become a dominant power in the Israeli (and global) economy. Israeli high-tech in general and start-ups in particular, cannot survive without successfully penetrating foreign markets. The main reason for the dependence on export markets is the small size of the Israeli market and its exposure to foreign competition. Being remote from the target markets produces different issues that must be considered during the establishment of the start-up and its life time. The research identifies the key success factors for an Israeli high-tech start-up company and suggests an implementation model taking into consideration the special environment in which Israeli high-technology start-ups operate. From the discussion so far and the literature (Hashai and Almor, 2004; Dvir and Tishler, 1999; Dvir, Hauptman, Hougi, Tishler, Sokolov, Sharan and Shenhar, 1997; Lerner and Yeheskel, 2002) the salient points appear to be:

- Penetrating global markets is a must to survive and succeed;
- Foreign market needs and behavior are not very familiar to Israeli remote ventures;
- Israeli culture is different than the culture in the target markets;
- Capable start-up management is critical for handling rapid shifts in the environment;
- Need for coordination among many players such as:
  - Entrepreneurs, core team, venture capitalist, opinion leaders;
  - Marketing and sales force, outsourced organizations, special customers;
- As a small player strategic alliances or mergers and acquisitions are frequently crucial to enable penetration of the market and often providing the desired complete solution.

1.7 Summary of the research foundation

The high-tech industry has proven to be very significant to the global economy and to the Israeli economy in particular. Israel has adequate human resources to support the development of high-tech industries which continuously increase their share in the entire economy. Israel as many other small countries is striving for economic independence and start-ups play a major role in stimulating and expanding the high-tech role in the economy growth. Throughout industrial history, it has been established that despite all good ideas, investment of capital and rigorous endeavors, it is

still tremendously complex to attain a successful start-up enterprise. From past experience in Israel and around the world it is known that most of the start-up companies are doomed to fail commercially. The acknowledged statistics show that only one out of about hundred start-ups in the USA, and one out of about thirty in Israel, has been successful. Despite the fact that the success rate of start-ups in Israel is only about 3%, it has been dubbed by many leaders of the high-tech industry the "Middle East Silicon Valley".

The extensive technological start-up activity has produced a swift and impressive increase in the scope of equity financing as well, mainly in the high-tech sector. Development of international high-tech markets and the success of Israeli high-tech firms have driven development in the local venture capital market and in Angel activity (Lerner and Avrahami, 1999). Some claim that the many investors push for an early divesture from precious assets damaging the Israeli economy in the long run. In general it is already observed that the recovering economy, after three years of recession, provides a renewed boost to the start-up industry and the entire economy.

Most start-ups worldwide are not lacking technological capability. In Israel, even more than in most other countries, the high-tech industry and the high-tech start-ups are influenced by the advanced education for technology and by the modern defense sector, which has always been at the technological frontier. Since Israel is geographically isolated from its main markets (even the relatively close European market) many business issues such as management of enterprises with global aspirations and international marketing become even more crucial to the enterprise success than for European or American start-up companies. The European and American ventures can commence their blossom as nascent organizations in their local or neighboring markets. Existing literatures is not affluent with holistic frameworks based on theoretical and empirical evidence, dealing with the success of high-tech start-ups in general and even less though with those who need to start the business with a global approach. It appears that there are several key elements driving the success or failure of high-tech start-up companies that might be relevant for many start-ups and especially those high-tech start-ups residing in small countries with some level of isolation from their target markets. Only few of the topics driving likelihood of success such as the political and security situation are more specific to the Israeli environment. A construction of a practical model enabling start-up companies to assess their situation and take measures to improve them, can be of a considerable value in Israel and many other high-tech communities.

Most start-ups neglect the phenomenon described by Moore (1991) of "Crossing the Chasm". This means crossing the gap between the early market dominated by a few visionary customers (the innovators), who seek the technology, and the "pragmatists", the mainstream market, which includes the majority of the customers and seeks the technological benefits without handling any risk. "Crossing the Chasm" needs vision and a long-term marketing plan. This point will need future and individual attention.

The next paragraph delineates the hypothesis supporting the construction of the research model and derived from the aforesaid description.

1.8 The research hypotheses

The main purpose of this study is to construct and validate a model comprising the factors influencing Israeli high-tech start-up success.

There are some research hypotheses of a qualitative nature that are strongly associated with the development of the model. The following hypotheses are relevant to support the thesis model and could be tested within the research context:

1. Israeli start-ups share comparable factors influencing their success;
2. Business strategy is a main tool. A topic that must be planned, and frequently updated, according to the dynamic changes in the markets;
3. Marketing strategy and planning are decisive factors for the success of Israeli start-up ventures. The main reasons for failure are connected to lack of understanding the market place;
4. Most of the start-up companies lack management skills and experience;
5. Entrepreneurs and the core team are critical elements (as the heart, brain and driving force of the venture) but frequently impede the flexibility of the decision-making process hence preventing or postponing necessary changes;
6. VC funds are mostly interested in bringing the start-up to IPO as soon as possible and are not looking at the long-term objectives;
7. The Israeli security situation, economy, and distance from the markets have a comparable and decisive effect on the different start-ups.

This chapter has discussed the background to, and a broad overview of high-tech industries and start-up companies, the problems they face their relevance, contribution to the economy and importance and has clarified basic concepts such as entrepreneurship, marketing and so on. The following chapter (chapter 2) will explore further aspects of high-tech products and start-up enterprises and construct the preliminary models. It

provides the literature review with the endeavor to discover the main topics and parameters that influence young ventures' on their road to success. Based on chapter 1 and some models described at the beginning of chapter 2 the author constructs the basic model. After the literature review the basic model is expanded into the theoretical model at the end of the chapter. The theoretical model is augmented at the initial phase of the primary research (chapter 4) to create the research model which comprises the topics discovered at this study as influencing high-tech start-up success.

Chapter 2 - The Factors Affecting high-tech start-ups

"When you have a good idea, you're on the right track. However, you'll notice that a track has other trains on it, too. Move a little faster down the track and see if you can sell something. When this happens, this whole train begins to move;"

Start Up Journal, 1998

In practice, most new ventures are better characterized by directed chaos than orderliness. However, to develop a conceptual viewpoint there is a need to establish a theoretical framework which articulates the formative dimensions of a new high-tech venture. Thus, the purpose of this chapter is to review the literature in order to identify the conceptual categories considered important to new ventures.

There are no explicit definitions or exact statistics for the success of start-up ventures. While instinctively most people will think about technology as the driver of the high-tech start-up, it is already known that lack of technology is not one of the salient factors for failure. The reason is probably that most high-tech start-up entrepreneurs have a strong technological background and base the start-up on a unique technological idea. Cunningham (2000) asserts that more failures in high-tech can be attributed to business reasons rather than reasons associated with the technology. However, studies (Cooper, Gimeno-Gascon, and Woo, (1994); Dahlquist, Davidson, and Wilkund 2000) suggest that there is no single dominant factor influencing the venture's destiny and that several dimensions shape the probability of success.

2.1 Models for assessment of start-up ventures

"Technological fermentation is not enough; there is a need for management and marketing fermentation, as well as for financial fermentation".

Galor, 1998

Bell and McNamara (1991) describe the Bell Mason model, one of the best known models for assessing start-ups. The model identifies four major fields and includes twelve distinctive dimensions (shown in table 2). The model suggests a four stage assessment; the concept stage, the seed stage, product development stage and market development stage. After these four stages a start-up company should reach a steady state phase. During the first two stages and the first part of stage three the venture builds a market model. Somewhere during stage three and continuing in stage four it tests the model. The assessment process utilizes a relationship graph plotted

against the ideal model of success together with rules to evaluate each dimension in order to assess a start-up situation.

The twelve dimensions are as follows:

Technology Product	Marketing/Sales	People	Finance/Control
Technology/Engineering (R&D)	Business Plan	CEO	Operations/Control
Product	Marketing	Team	Finance-ability
Manufacturing	Sales	Board of Directors	Cash

Table 2: Bell Mason dimensions for start-up assessment

A similar approach of Macmillan et al. (1987) utilizes four dimensions; the Entrepreneur, the product, markets and finance. Cooper et al. (1994) take a slightly different approach and specify four groups as necessary initial conditions for all new firms as predictors of new venture performance. The groups are: general human capital (the knowledge that could lead to higher productivity and access to network resources utilizing the general background of the entrepreneur); management know-how (the entrepreneur's previous experience with general management tasks); industry-specific know-how (understanding of how business is done in the specific industry); and financial capital (provides more freedom to explore different strategies). But this model and groups are focused on the initial stage of a firm and are not focused on high-tech ventures.

Davidson and Klofsten (2003) describe a model dubbed the business platform which comprises eight firm-level cornerstones; the business idea, the product, the market, the organization, core group expertise, core group drive/motivation, customer relations, and other relations (additional know how in areas such as management and relations with external entities such as banks). These cornerstones can be divided into the development process (idea, product, market, and organization), key persons (Founder, CEO, Board of directors – expertise and motivation) and the flow of external resources (customer and other firm relations). The process emphasis in Davidson and Klofsten's work seems to capture the inter-dynamic nature of the new venture creation rather better than a static list of elements. But the model focuses on the early development process of the firm and the requirement of every cornerstone in order to overcome initial vulnerability. The authors believe that it is relevant to many types of young firms although it was tested primarily on high-tech young venture.

Roberts (1991b) developed a model of factors influencing the success of technology- based companies during the different stages of the start-up life. According to Roberts (1991b), the principal features assuring a successful entrepreneur, include family background, education, work experience, personality and motivation. The entrepreneurs' characteristics have a strong influence in the pre-founding stage. People tend to view and measure success by different standards, especially in regard to self-assessment. Roberts (1991b) observes that very few of the technological entrepreneurs' quantifiable personal characteristics relate to their later success, but mentions other important points relevant to post founding success.

Among the points emphasize by Roberts (1991b) are:

- The high-tech performers, which combine high need to achieve with moderate need for personal power, and provide leadership with a participatory style;
- the optimal team of co-founders which should consist of technological capabilities balanced by sales and marketing experience;
- a majority of the successful companies are hardware oriented and start with larger initial capital;
- initial marketing orientation is a critical success factor and some of its salient features contain the sales experience, attentiveness toward customers' inputs and awareness of competitors' behavior;
- early marketing functions also signify venture success;
- managerial orientation is crucial, requires business experience and some of its features towards success are early recruitment of senior managerial staff, a good balance of technical sales with manufacturing and administrative aspects as well as sensitivity to cost structure.

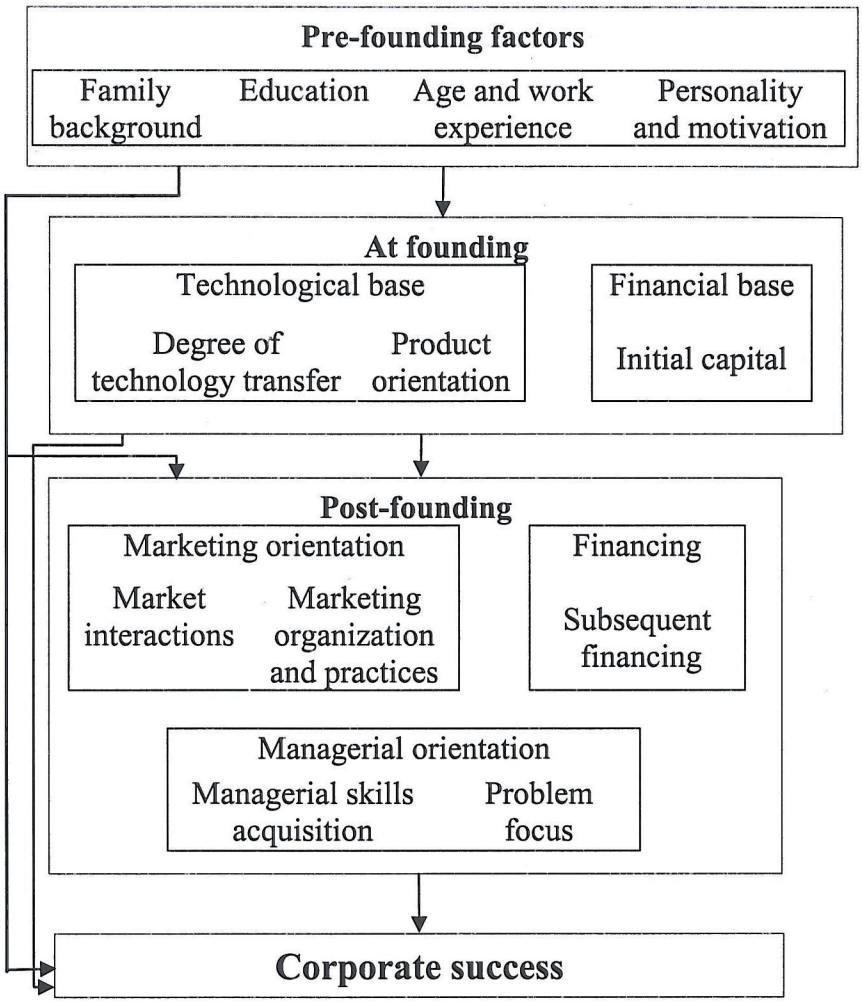


Figure 3: Roberts' model of factors influencing technology based ventures

2.1.1 The basic research model

In summary, the literature indicates six distinctive domains of new high-tech ventures; entrepreneurship, strategy, marketing, technology and products, management, finance and control but does not take in account that the start-up venture is also affected by many indirect factors in the external environment (in addition to the input sources). In order to have a holistic approach we have to add to the models mentioned above the broad view of the external environment. If so, it appears that high-tech start-ups relate to seven different domains: Entrepreneurship, Business Strategy, Marketing/Sales, Technology/Products, Management, Finance/Control and the External Environment with which the young enterprise has to accommodate and has to adapt to its changes. The customers portrayed in the model are the goal of the venture and its road to success. The entire company has to be attuned to the customers while the marketing serves as the channel for communication. The basic model including all the general domains affecting high-tech start-up activities is depicted in figure 4.

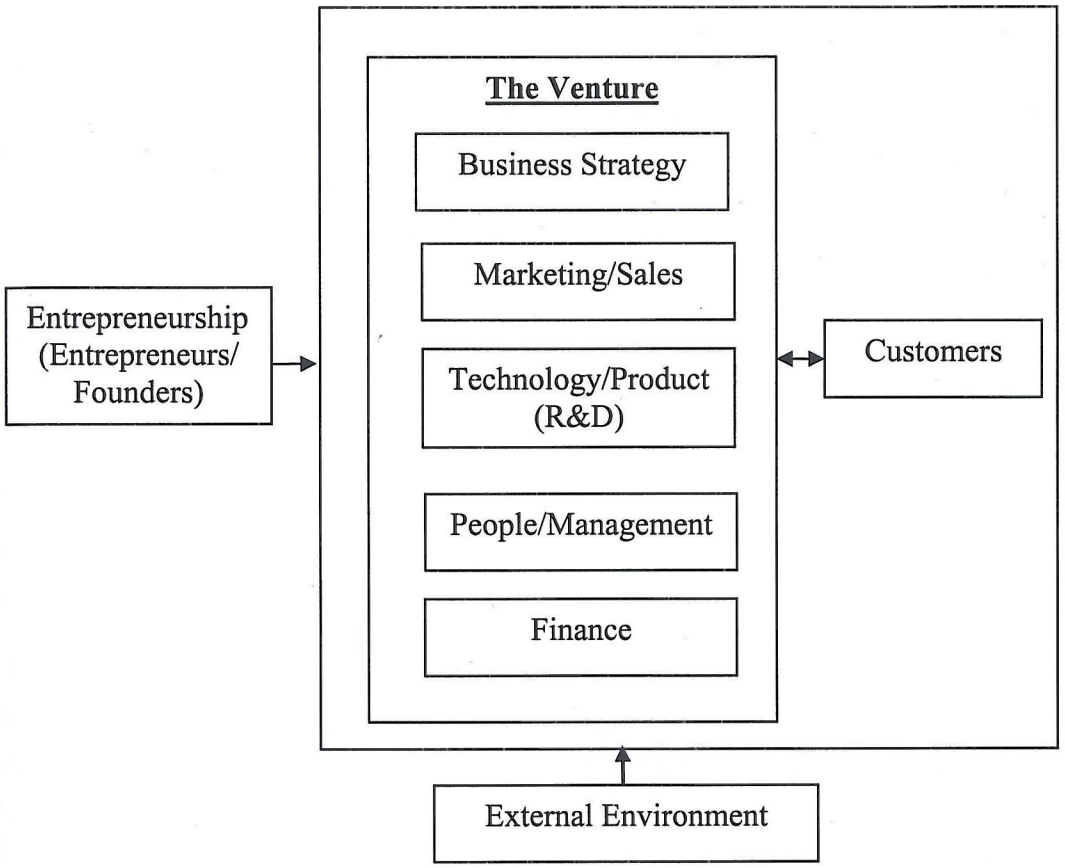


Figure 4: The basic model of the domains influencing high-tech start-ups

The following parameters of this chapter deal with the different domains influencing the success of high-tech start-ups with some focus on the Israeli environment. The literature review leads to the expanded theoretical model presented at the end of the chapter.

2.2 Aspects of Strategy

"It is astonishing how so many start-ups do make the same mistakes all the time"

Paltieli – CEO "Ultra Guide", 1998

There are different schools advocating start-up strategy in order to gain competitive advantage. Two common approaches are the formal strategy led by frameworks such as Porter's (1980) 'Five Forces' model, analyzing the forces driving industry competition, and the other adaptive 'visionary' approach, led by Mintzberg (1994), whereby the organization is run according to a mission, and decisions are reached through learning and experience and are based on the intuition and creativity of key personnel. Mintzberg (1994) believes that proactive and dynamic processes should be used in developing the final strategy.

A very common formal method, but realized today as not comprehensive enough is the SWOT (Strength, Weaknesses, Opportunities, and Threats) analysis. Hamel and Prahad (1994) suggest exploring the market opportunity according to its level of conservativeness. They employ measures such as the level of industry concentration, common profit recipe in the industry, traditional management, slow adaptation of new technologies, relying on entry barriers (not much innovation), orthodox ways of serving the customers, managers activity level with regulatory issues (instead of creativity). Furthermore, the company should be analyzed in terms of foresight, breadth, uniqueness, consensus and action-ability. The environment within the industry is another important issue related to the strategy in general and marketing strategy in particular. A dynamic environments support pioneering strategies on the part of firms to preempt competitor entry (Ali 1994; Utterback 1994).

First-mover advantage lies in the ability to enter the market in a niche the firm has created, to establish the standards competitors will have to follow and to achieve an uninterrupted or challenged period of time in which to build brand recognition. However, a pioneering strategy is risky and demands high expenditures in R&D, market development, and customer education (Ali, 1994). Cooper (1979) does not find "First to market" to be a key determinant of success or failure probably due to the many hidden pitfalls associated with this strategy. One of the reasons the risk level increases with this strategy is the difficulty to assess new "to be born" markets' prospective. Christensen (1997) elaborates that market research will show little interest at this situation. He adds that revolutionary breakthrough ideas have a superior advantage and create easy differentiation and large barriers for competition entry, but it is more complex to demonstrate market potential and provide evidence for sustainable profits.

The presence of attributes known to support venture viability and likelihood of success are critical at the foundation of a new venture. Hannan and Freeman (1977, 1984) argue that organizations seldom succeed in making radical changes in their core strategy and structure in the face of environmental threats, because they are subject to strong inert forces. Changes in the core strategy lead to an increased probability of organizational failure and death.

One of management's most critical strategic choices is whether to compete broadly across many geographic segments or, alternately, to focus on a more limited set of geographic markets. Some researchers suggest a broad

strategy for high growth markets and focused strategy whilst penetrating a mature market and others advocate focusing in the early stage of products. Several of the recent studies describe the importance of multiple strategies (Chandler and Hanks, 1994; Mahoney and Pandian, 1992). These strategies can include among others: Quality Strategy, Cost Strategy, Innovation Strategy and Customization Strategy. Several scholars (Kakati, 2003; Sandberg 1986; Mcdougall, 1989) conclude that better performance is achieved when two or more strategies are used simultaneously while Kakati (2003) discovers that customization strategy appears to be the most vital for success. Kakati (2003) found that multiple strategies are the logical choice provided the firm acquires multiple resources but most small start-up ventures find it difficult to develop multiple resources to successfully implement broad strategies. Then the natural choice is to pursue focus/customized strategy. The performance of a new company is improved when there is a fit between its resources and strategies (Chandler and Hanks, 1994). The second facet is the broad or focused strategy of the product/technology. Since many of the entrepreneurs/founders arrive from a strong background in technology/science, they tend to employ a technology dominant strategy instead of an ongoing technology-based, market-focused strategy. Schumpeter (1942) finds innovation as being increasingly dominated with large firms who have the critical mass necessary to engage in large scale innovation, serving as entrance barrier for competitors. Start-up firms simply do not have the knowledge base or R&D budgets to compete with the established firms. It means that entrepreneurs should focus on market niches that are not occupied by large firms in which technology is advancing at such a fast pace that entry barriers do not exist (Christensen, 1997). Davidow (1986) emphasizes that the young enterprises striving for success should achieve leadership in a niche market. But some start-up managers such as Rowen from the Tensilica IP say that in such an environment it is impossible to predict which of the markets would be hotter or cooler. High-tech start-ups are strongly advised to focus, which does not enable spreading efforts in different markets. In today's volatile high-tech markets it makes it is very risky to bet on one particular market. This is probably one of the main reasons high-tech start-ups are so risky and only a low percentage matures to become a success. The key to success is to imagine and create the markets of the future. The dynamic of today's high-tech markets changes at a tremendous pace, demanding continuous consideration of the target markets, the technologies, the customers, and employees' motivation (Hamel and Prahalad, 1994).

Some start-up companies succeeded to be acquired before having real sales. Getting acquired by an industry giant appears to be a quick path to riches for a start-up team. At the end of the 1990s when the economy was booming some entrepreneurs succeeded to reap quick benefits. But building a company with the goal of being acquired is a very risky strategy. The chances of a start-up being acquired for massive dollars are low. Given the high failure rates for high-tech start-ups, a respectful VC will not invest in a shortsighted team not committed to creating a sustainable, profitable, and fast-growing business (Forbes, 1999).

The alternative to save some of the costs, share risk and improve success chances is to establish an alliance with a partner. The alliance can be based on a joint development of the product and/or marketing efforts. The alliance can have a limited context of cooperation or a strategic alliance. A strategic alliance between a small high-tech start-up company and a large institute can often be complex, problematic and not effective. But tactical alliances that have the purpose of accelerating the formation of whole product infrastructure within a specific target market can be very useful. Perlmuter (2003) makes the point that industry leaders and company managers have to understand the markets and their limits and channel their creativity to solutions and cooperation with the big organizations to provide the customer with the complete product. The issues of marketing and complete solution are discussed in the subsequent paragraphs.

Several scholars (Frenkel, Reiss, Maital, Koschatzky and Grupp, 1994; Steinberg, 1999; Goldman, 2001) emphasize the access to overseas markets as essential for the survival of a start-up enterprise. International strategy in small businesses has been investigated in studies where product characteristics (McDougall, 1989), marketing strategies (Cavusgil and Knight, 1997), or patent and manufacturing capabilities (Baird, Lyles and Orris, 1994) have made a difference to the type of internationalization strategy pursued. For Israeli start-ups, with a very limited local market, success is based on their ability to penetrate overseas markets.

Smith (1998) in a study conducted in Scotland finds strong evidence that small firms which use strategic planning in an effective manner and a long planning horizon will produce superior performance relative to those small firms which leave things to chance and deal with problems as they occur. Kotler (1988) defines strategic planning as the managerial process of developing and maintaining a viable fit between the organization's objectives and resources, and its changing market opportunities. Hamel and Prahalad (1994) emphasize the need to revisit the plan while elaborating

and adjusting it as the future unfolds. In contrast to the 1990s current high-tech start-ups are being advised to adopt a more conservative, long-term approach to managing their business. Issues such as sales, staffing and cash-flow are now priority areas, requiring strategic planning and management.

2.3 Marketing high-tech small firm products

> ***"Finishing product development and shipping the first product for revenue are considerable milestones in the life of a high-technology start-up"***
>
> *Schoonhoven, Eisenhardt, and Lyman, 1990*

A key path to opportunity recognition and subsequent exploitation, specifically with regard to present and future customer needs, is manifested in a firm's market orientation. Market-oriented businesses usually seek to develop a systemic process through which firms recognize opportunities by identifying customers' expressed and latent needs and market trends and develop superior solutions to meet them (Cooper, 1979; Kohli and Jaworski, 1990; Day, 1999; Slater and Narver 1995, 1999; Jaworski and Kohli, 1993). While some researchers argue that firms with a strong market orientation may over-emphasize current customer needs, possibly overlooking future products and growth opportunities (Christensen and Bower, 1996), but other researchers, such as Slater and Narver (1998) disagree. Cooper (1994) identifies strong market orientation – a market driven and customer focused "new product process" as a key success factor for new products.

2.3.1 Unique characteristics high-tech marketing

> ***"With a few exceptions, high-tech start-up CEOs may know technology, but they are clueless about marketing. They simply believe that if they build it, customers will come".***
>
> *Beach, 2002*

A major issue concerns the unique characteristics of high-tech marketing. Rosen, Schroeder and Purinton (1998) argue that there are specific features of high-tech markets that are believed to distinguish them from other product categories. Gardner, Johnson, Moonkyu and Wilkinson (2000) identify the high-tech market environment as comprising the following main unique characteristics, earlier stage of the industry life cycle; greater degree of turbulence; higher product differentiation; higher market growth rate; shorter expected life cycle; more visible future for technology; easier entry into the market; more diverse suppliers and a higher level of consumer involvement in purchase decisions.

High-tech marketing environment contains three main themes. The themes and their key components are described in table 3.

Market Uncertainty	Technological Uncertainty	competition volatility
• Needs to be met by new technology	• New products functioning	• Future competitors
• Changing needs	• Meeting delivery timetable	• Competing products
• Market adaptation of industry standards	• Vendor quality of service	• future competitive tactics
• Pace of innovation penetration	• Product/service side effects	
• Size of potential market	• New technology level of cannibalization	

Source: Mohr, 2001

Table 3: The high-tech marketing environment

There is a disagreement between scholars about the importance of the market attractiveness. The source for the difference might be that some scholars tested the attractiveness for new products while others tested the attractiveness for new ventures. Nesheim (1997) holds that the target market should be a large rapidly expanding so that the venture should consider market size, intensity of competition, revenue (and margins) potential over five years and potential customers. The ensuing key question should reflect the ability to establish a unique positioning in a well-defined market and assess the potential for expansion. Mishra et al. (1996) found that markets growth and size are often highly positive correlated with new product success. But conversely, Stuart and Abetti (1987) found a strong negative correlation between success of young technological companies and market attractiveness. Their study shows that companies entering smaller and slowly growing markets were doing better than those in the larger faster growing markets. Cooper (1979) uncovers that market growth and size are non crucial facilitators for the success of high-tech products. This may be due to lower level of competitiveness and the avoidance of head on competition with large and powerful organizations. Lucrative markets are also attractive to big companies. In contrast, there may exist many smaller, apparently less lucrative markets that provide unique opportunities for high-tech start-ups offering new products.

The concept of targeted customers with a solid marketing strategy for the future is important for any business and crucial for a high-tech start-up fighting in a dynamic world and requiring long arms to penetrate distant markets. Roberts (1991b) explains that strategic evolutions are manifested

in maintaining focus on products and markets with some degree of technological aggressiveness. Very successful ventures quickly use marketing tools for switching from selling to Original Equipment Manufacturers (OEMs) to selling and servicing their end users. They switch from technological uniqueness toward price/performance and customer service dimensions. Davidow (1986) observes that successful products are accompanied by a strong support to the distribution channels.

2.4 The product and the complete solution

Great "devices" are invented in the laboratory; Great "products" are invented in the marketing department (Davidow, 1986). When a device is properly augmented so that it can be easily sold and used by a customer it becomes a product.

> ***"One-trick ponies won't survive; we had to have a road map and an architecture from which we could spawn new products ".***
>
> *Akella, CEO of Ample Communications Inc., Fremont, CA, 2003*

The success of specific new products has been studied extensively for more than 30 years. The consultancy firm Booz-Allen and Hamilton determined in 1982 that 67% of new products are killed before commercial launch. From the remaining "Go" projects, 25% become commercial successes and 12% are failures. About half of these products are cancelled at a late development stage or during commercialization after a much of the planned budget was already spent.

Studies show that the single, and most important, dimension for success of industrial new products is that the product is perceived as unique and superior. Those types of products are highly innovative and new to the market and incorporate obvious benefits to the customer. The studies show that some of the main features are that the products meet customer needs better than competing products and solve real problems, reduce customer's total costs, are implemented with advanced technology and designed for world wide use, contain the possibility of patenting and are of high quality (Cooper, 1979, 1993, 1994; Debelak, 1997; Cooper and Kleinschmidt, 1990). Cooper (1979) dwells on the importance of market knowledge and marketing proficiency in terms of market assessment, market studies and market test. Cooper (1979) states as important also the understanding of market aspects such as price sensitivities, buyer behavior, market potential and competition as well as having a strong sales force and distribution effort, well-targeted at launch. Identifying market needs requires a combination of marketing and technical skills. It is critical in the ultimate fight in the marketplace for acceptance and as part of strategy development.

Cooper and Kleinschmidt (1990), Gardner (1990a, 1990b) and Gardner et al. (2000) assert that variables related to marketing effectiveness, market potential and market structure are critical for both original and reformulated new industrial products. MacMillan et al. (1987) found that a major predictor of venture success is the degree to which the market displays acceptance of the product. One of the main difficulties is the product adaptation to the different market segments and users. Innovators, early adopters, followers, late adopters - each require a different product "package" and different countries and cultures might also require specific adaptations (Davidow, 1986).

The ultimate goal is to achieve a "Sustainable Competitive Advantage". This means Products with Sustainable Competitive Advantage deliver capability gap in the form of superior value in attributes, enduring over time, which are customer's key buying criteria. Nesheim (1997) asserts that a main concern of investors deals with the unfair advantage in respect to the venture's ability to switch gears and change direction if the market moved or is just different than anticipated. The second concern deals with the scope and extent of the venture; is the venture designed around a product (shooting star) or is it a real business.

Price is naturally important as being a salient ingredient of the total cost and value. Gardner et al (2000) assert that price and channel support are important for success in all kinds of products. In one of his early studies Cooper (1979) already identifies price as a major barrier to the success of new high-tech products.

Roberts (1991b) explains that strategic evolutions are manifested in maintaining focus on products and markets with some degree of technological aggressiveness. The strategy of successful companies includes steady advance in core technology exploited through market expansion assisted by gradual addition of distribution channels. Very successful ventures quickly use marketing tools to forecast sales, for market analyses and for switching from selling to Original Equipment Manufacturers (OEMs) to selling and servicing their end users. They switch from technological uniqueness toward price/performance and customer service dimensions.

Davidow (1986) monitors the "whole product" concept with respect to marketing imagination. The product can be described in different layers starting from the generic product which is the idea. The next layer is the expected product. The expected product is the minimum configuration of

products and services that have a chance of achieving the buying objective. The higher level is the augmented product which has the maximum chance for realizing the buying objective. The last layer is the potential product which is the growth potential of the product and future ancillary products. One of the main difficulties in providing a whole product is that the cost of providing such a complete product might entail a heavy burden for a young and small company.

2.5 Customer

> ***"The key to this survival strategy is to spend a lot of time talking with customers; you have to make sure your road map lines up with the customer's road map"***
>
> *Akela, CEO of Ample, 2002*

Peters and Waterman (1982) find that outstanding companies have a keen sense of customer's needs and award them a high value. The importance of buyer/seller relationships, particularly in improving the new product development process, is a growing area of study (Birou and Fawcett, 1994). The potential for the venture to persist over time can be observed through the repetitive and long-term purchase patterns that result from customer commitment (Ghemawat, 1991).

> ***"A start-up seldom gets a second chance. If you don't hit the Bull between his eyes, you pass by in the dark with nobody even noticing that you have ever been there."***
>
> *Yuval Davidor, Schema founder, 2003*

Usually there is no second chance for a start-up to introduce a solution. Yuval Davidor, the founder of Schema, claims that the issue is one of planning the collision of two psychologies: The enterprise psychology versus the customer psychology. Most start-ups fail by defining the market according to the product. A reversal of the idea is needed: Define the "whole product" according to the customer needs and his psychological desires. Once the customer is involved and offered a solution, his full cooperation is obtained. Many potential customers are slow to commit to buying anything, let alone a new platform that requires a whole new way of thinking (Reingold, 2001).

Cooper and Kleinschmidt (1990) locate purchase and customer features such as dissatisfaction with competing products, great willingness to try/accept new products, the importance of purchase, purchase magnitude and the frequency of purchase as important for a product's success.

Comments such as "listening to customers and customer needs" and "applications knowledge to help customers" are very common among international companies. It manifests that global firms have to be attentive to the customer and their strategy has to be customer-driven. For born global leaders to become international is strongly affected by their informal and formal networks. For Israeli start-ups, remote from their target markets, neglecting customers' real needs and feedback while assuming "we know what the customer needs", could be a decisive mistake. Cultural differences encourage the prevalent habit of skipping and avoiding the "Customers' Voice".

2.6 R&D

> ***If there is one thing Israeli high-tech companies lack, it is the ability to transform a great technology into a usable product with a suitable human interface.***
>
> *Israeli Industry Leaders*

Israel is second in the world with Japan, after Sweden, in the volume invested in civilian R&D (ICBS, 2001). Because of the high concentration of scientists and engineers and high level of R$D spending, Israel has gained a competitive advantage in this area. Israel's efficiency, according to Grupp, Maital, Frenkel and Koschatzky (1992) in generating research is relatively high, but declines rapidly as the fruits of that research are moved towards commercialization.

Schumpeter (1934) suggested that some entrepreneurs with high-technological ability are engaged in the process of "creative destruction". Creative destruction involves the use of new technology to transform markets, essentially destroying the status quo and creating a whole new wave of innovation. Product innovation is a multidisciplinary process. But development of new technology does not guarantee commercial success (Berry, 1996). Porter (1983) says that technology can be a basic constituent of creating defensive competitive strategies, but this view has to be seen as one element of an overall competitive strategy. The technology strategy has to be integrated into overall corporate strategy (Erickson et al., 1990; Green, 1995).

Many researchers support the notion that there is a need for strong links between the R&D department and other functional areas (Roberts, 1978, 1979; Wind 1981, 1982; Goupta, Raj and Wilemon, 1986 and von Hippel 1978). Even though all functional interfaces are important in the product development process, effective integration of R&D and marketing is

emphasized as essential for innovation success. Goupta and Wilemon (1990) describe this relationship especially critical in technology-based organizations. There is evidence that linkage problems are common and when these are not resolved failure is the usual result. Supporting these conclusions are several studies (Young 1973; Souder 1977, 1981) which note that the failure to integrate R&D and marketing early in the innovation process is one of the biggest contributors to new product failure.

Another obstacle for success in developing new products is the desire to make a "perfect" product not coordinated with real market needs. It increases R&D costs and delays the product introduction into the market.

2.7 The management team

> ***"Development of products for the sake of development is the thing that engineers love to do. But business means to know who will be the first that will buy your development and how much will he pay for it. You have an excellent idea, great. Now go and find a leading team and first find your marketing strategist".***
>
> *Gillin, 2001*

High-tech is an evolutionary and fast moving environment and corporate survival depends upon successfully managing that evolution (Leonard-Barton,1992). The pace of environmental change requires start-ups to be managed, not only by skilled managers, but also by a team capable of managing transitions since this is essential to success in changing markets (Eisenhardt and Brown, 1998). Roure and Maidique (1986) demonstrate that founders of successful high-tech ventures tend to form larger, more complete teams.

Entrepreneurs are people who come with the idea and usually are the founders of the enterprise. They play a decisive role in the enterprise establishment phase and all decisions regarding the structure, behavior and leadership of the start-up. Founders have a crucial role in the success of the enterprise, at least in its embryonic phase. One of the biggest difficulties is the founders' readiness to step aside to let more-experienced managers run the company. Problems should be addressed before it is too late, rather than deny when companies are in trouble. Neutralizing the founders' involvement, should the Board of Directors decide so, is complex and often harmful, since the entrepreneurs are the soul, heart and often the brain of the venture. Replacing them is usually successful when a radical change in management skills is required due to failure in achieving major milestones or a very high growth.

The literature contains many examples of high-tech entrepreneurs transforming markets such as Bill Gates and Gil Shwed from Israel. The notion of technology driven entrepreneurs and entrepreneurship is a well-known phenomenon. Timmons et. al. (1977) and the Wall Street start-up online journal[1] discuss the qualities entrepreneurs should possess to find solutions in an era of speedy, unpredictable change as the high-tech arena. They identify some special features and skills such as, total immersion of commitment, creativity and innovation, ability to apply clear strategy knowledge of the business, a realistic and global view, ethical behavior, integrity and reliability, management of people and team building, an ability to deal with technology flexibility, passion, a robust network and the ability to understand economic value.

Reingold (2001) quotes the famous Professor Prahalad who established Praja start-up. Prahalad says that one must steady the organization and have a passionate belief that what one is doing is important. Leadership is about what one should do when the going gets tough. Leaders must behave like emotional and intellectual anchors, with no external cues. The critical issue is about faith, passion, and, most importantly, authenticity so that people know one is not pretending. People can see a sham. Lerner and Avrahami (2002) found in their research that Israeli entrepreneurs have a good reputation in creativity and innovation. Israel has a high level of high-tech start-up CEOs with technological and management integrative education. But they also identified that lack of experience and proficiency in management; marketing and finance are identified as main reasons for failures of new ventures in Israel.

Sandberg and Hofer (1987) are among those who reduce the role of the entrepreneurs in relation to other factors. The founders are the entire cause at the pre founding phase in which they obtain or originate the idea, gather resources and set up the initial strategy (Kakati, 2003). But the founders have to be an integral part of the core team once the venture is founded. At this stage the overall strategy has to be thoroughly planned. The entrepreneurs' role in the start-up success was already explored in several research papers and books and many will probably continue to investigate this effect in the future. It will therefore not be the focus of this study which deals with a general framework for the start-up success. This research relates to entrepreneur(s)/founder(s) as part of the core team.

[1] edited by Paulette Thomas

High performance new firms are rarely started by individuals. 80% of them are established by teams (Reynolds, 1993). The core team is one of the major factors for a young high-tech enterprise success. The team includes the management augmented by the board of directors and sometime some additional key employees in the organization. The main aspects related to the core team are the completeness and complementary level of the core team. A few studies find that linkage between team completeness and previous joint experiences were strongly associated with firm performance (Chandler and Hanks, 1998, Roure and Keely, 1990). A diversified management team, in which technological expertise coexists with business skills in other key areas such as marketing and finance, is recognized as a deciding factor for success in high-tech start-ups (Roberts, 1968, Cooper 1973). Another aspect is the utilization of consultants and advisors at the different stages of the start-up. The core team, and especially the founders, very often believe they possess all the required knowledge and refuse to employ experts who can open their eyes in different areas. Entrepreneurs must be willing to hear dissenting voices, whether it is from a venture sponsor or from elsewhere in the company. Timmons et. al. (1977), MacVicar and Throne (1992) and Zacharakis and Meyer (1998) assert that the core team will have to develop a viable idea, perform a realistic assessment of the strategy, analyze its feasibility and prepare a sound fundable business plan. Team solidarity and friendship are similar to the feeling of esprit de corps that is present among officers as a result of the demands for expertise, responsibility and cooperation in the military profession (Sorensen, 1994). In Israel the military influence on civil life is very strong and each person serves in the army and reserves. The impact of military values, leadership style and team solidarity have a significant effect. Among the founders of high-tech start-up companies are many military reserve officers. A spirit of an elite military unit with good commanders and the atmosphere of fighting together for the same cause can be a very strong factor in the success of a start-up.

The Israeli high-tech start-ups are usually heavily funded by VCs and/or angels who often have the majority vote in the board of directors. Hence investors are normally a critical element in the start-up entity and have to be selected carefully since each investor has his focus and interests. A good fit of the investors into the venture can have a meaningful contribution, but a lack of such fit can be quite detrimental. Zacharakis and Shepherd (2001) suggest that VCs lack a strong understanding of how they make decisions. In addition to be short of introspection, VCs are overconfident in their decision process and that overconfidence negatively affects their decision accuracy. There are several mechanisms in which venture capitalists may

add value to their portfolio companies. VCs can have strategic roles by assisting in strategic planning and monitoring, acting as a sounding board, being business advisor etc. and investors can also help in chores such as obtaining additional financing as well as providing non-financial assistance in introductions to potential customers and suppliers, recruitment of key executives, and solving interpersonal issues (MacMillan, Kulow and Khoylian, 1989: Gorman and Sahlman, 1989; Sapienza, 1992; Goupta and Sapienza, 1992; Sapienza, Manigart and Vermeir, 1996; Hellman and Puri, 2001).

Globerman (2003) discusses the issue of foreign managers who are behind almost every Israeli success story. It is clear that success in foreign markets necessitates foreign managers who understand them, the language and the culture. But there are some difficulties to attract good managers to work for Israeli companies. The reasons for that, among others are related to the characteristics of the Israelis and their behavior. Israelis do not have a management perception; The Israeli is considered as workaholic and arrogant; Foreigners have a hard time being accepted by the inner circle of decision makers; Israeli companies are parsimonious; Israelis hire an expert but want to coach him.

Lerner and Yeheskel (2002) identify that management style may have a great impact on start-up success. It concerns the relatively consistent pattern of behavior that characterizes a leader (Dubrin, 2001). The most famous typology of leadership styles is of authoritarian, democratic, and laissez- faire leadership. Since 1930, the impact of democratic and authoritarian leadership on groups have been compared with laissez faire leadership (White and Lippit, 1960) which results in less concentration on, and a poorer quality of work than the other styles.

The method of organization and level of formality can affect the atmosphere and attitude of the employees thus influencing the achieved outcome. The formalization is the degree to which divisions of labor and procedures are explicit rather than implicit (Rondeau, Vondrembse and Ragu-Nathan, 2000).

2.8 Finance

Funding is the oxygen needed to keep the start-ups alive. Most high-tech start-ups commence by raising seed funds and later raise additional rounds of capital until exit or acquisition. There are very few high-tech start-ups in the modern era that operate according to the old scheme by raising private funds and striving for success without becoming public or being procured

by a bigger company. The high-tech start-ups in Israel receive their primary funding from VCs. As described in the introduction Israel has the highest ratio of VC funds as percentage of the GDP. VCs have different attitudes towards start-ups. Some invest in the earlier, more risky, stages of the start-up life and hence tend to be more involved, others prefer to invest at a more mature stage.

Angels are individuals (who may act as a group) who actively invest in start-up companies. In comparison to VC organizations, an angel investor generally wants less control over the company; however the criteria for investment are likely to be similar. Angel investor groups are great sources of private capital and frequently invest angel money into new companies (VentureWorthy.com, 2004). They commonly do it at the early "seed" phase of the company.

Lerner and Avrahami (2002) find that the availability of funding for new entrepreneurship in Israel is quite high. Especially obtainable is the Venture Capital as a major source for private funding in new enterprises. From the financial perspective investors are mostly interested to know about the required capital, its timing and the expected profits.

One of the major difficulties in obtaining funds for new high-tech ventures is the recent reduction in Israeli government guarantees and subsidies to new entrepreneurs. There is also a substantial decrease in foreign investment in Israel as a result of the slow global economy as well as the effect of the unstable security situation in Israel. The funding situation started to recover in 2004 and is expected to continue its improvement in 2005 primarily due to the better climate in the global economy and new political hopes in the Middle East. Those instigate new inflows into Israeli based VC funds.

What was the reason so many experienced investors (Angels, VC firms and companies) fall into the "new economy" trap? The common claim is that it was investing in start-up companies which could not prove sound business reasons for establishing their enterprises. Katzenstein (2001) claims, that the main motivation behind such investments was pure greed. In addition, the relatively young and inexperienced Israeli Venture Capital industry could not perform better than their counterparts in the western world and tumbled into the trap of quick and irresponsible investments. Even large and established companies such as Lucent, were drawn into the game and lost money and their own value. Those companies supported young start-up

companies with equipment (often reporting sales) and had to report big losses when those young enterprises collapsed.

VCs are often the main investors in start-up companies and hence control the board of directors. Many of them claim that they have to maximize profits quickly. VCs underline that in recent years income from selling high-tech companies was much higher than income from high-tech IPO. But is this the best strategy to maximize profits in the long run? An interesting view about this theme is discussed below.

Bainerman (2002) writes about broken promises of Israel's technology-based industries, referring to the great promise that Israeli high-tech had to offer the Israeli people. The "Promise" pertains to the great promise Israeli high-tech showed in the late l980s and early 1990s as leading the economic growth, while creating thousands of high paying, creative employment opportunities that could keep educated Israelis in the country and attract new immigrants from the West. Companies such as Gilat, Check-Point, Amdox and Comverse were founded during those years and have blossomed into multi-national operations, operated by Israelis with worldwide sales and marketing. Those firms are the pride and joy of Israeli business and proof positive as to what Israel can achieve in the high-tech sector. The Israeli VCs and their allies, the US investment bankers, claims Bainerman (2002), are solely concerned with quick exits and not with the once noble concept of building enterprises for the long term and for the benefit of the entire country. It is known that the idea of the VCs is to reap profit by a quick exit from the venture. The problem is related to the method and deliberation in which this is done. Entrepreneurs who want to go for the gold (i.e. building up the company for the long term rather than to sell out quickly) are often regarded by the VCs as "difficult," and nobody wants to be "difficult" with so many millions hanging in the balance. (Globes newspaper, April 5th , l999).

"I see a situation where individual Israelis have been successful in high-tech, but Israel as a country has not been successful in high-tech."

Nir Barkat, co-founder of BRM (Globes, August 24th, 2000)

In short, Israeli high-tech went from serving the needs of the Israeli economy, and hence the Israeli public, to the short term needs of the foreign investors and VC fund managers.

Investors are part of the external environment which integrates into the company usually by dominating the Board of Directors. This way they often become a decision power with strong impact on the venture destiny.

There are also other external factors, not necessarily controlled by the company, which might influence its future.

2.9 The outside world and external environment

Relationships with outside groups such as bankers, suppliers and customers are described by MacMillan et al. (1989) as very difficult because the outside groups are frequently hesitant to engage in activities with the uncertain start-up.

The most important task an entrepreneur faces in the throes of a start-up is finding the right advisers - both formal board of directors positions, and informal confidantes, according to Howard Schultz, chairman, chief global strategist and founder of Starbucks. Schultz talked to anyone he respected in his community who would listen - people with operations experience, people with a vision and who think big, and people with a great network who do not fear using it. The utilization of formal experts as consultants was already discussed in paragraph 2.7 dealing with managerial aspects.

2.9.1 The influence of external environment

There is no doubt that the environment has a strong influence on supporting resources for high-tech start-ups. Porter and Scott (2001) maintain, with respect to the general situation, that traditional thinking about the management of innovation focuses almost exclusively on internal factors - the capabilities and processes within companies for creating and commercializing technology. Although the importance of these factors is undeniable, the external environment for innovation is at least as important. The environment is seen as a pool of resources and will significantly influence the start-up process.

Specht (1993) classifies five main environmental factors affecting organization formation. The factors include the social aspect - impact of networks, cultural acceptance; economy - capital availability, aggregate economic factors and unemployment; political - support of public or semi public agencies; infrastructure development – several aspects such as the education system, the nature of the local labor market, incubator organizations, information accessibility and availability of premises; and market emergence - integrates concepts of niche emergence and technological innovation. The General Environment and the Economy are discussed hereafter.

- **General Environment**

The General environment contains many aspects which could have an impact on the start-up prospects. Some of the salient issues are the education, government support, the infrastructure and the culture.

Education

Perlmuter (2003) claims that, in the long run, the best solution for preserving high-tech competitiveness is a high level and strong education system, providing broad knowledge in many fields, not only in science and technology. Such cultivation has to start in infancy and continue throughout all stages of study and education, including higher education. Israel was successful in doing so in the 60s and 70s. But Israel lost some of its competitive advantage in this respect in later years.

The Israeli Defense Force (IDF) has special education programs such as *Talpiot* and *Psagot* to provide selected highly talented youngster with a unique and high level technological education. Many of the high-tech start-ups include graduates of these programs and other graduates of the Israeli Defense Forces technological units.

Lerner and Avrahami (2002) discovered that relative to most other countries considerable attention is paid to entrepreneurship in the Israeli school system but it still needs improvement both there and in universities and colleges.

Infrastructure and Government Support

The common innovation infrastructure is the set of factors that support innovation throughout an entire economy. They include the overall human and financial resources a country devotes to scientific and technological advances, the public policies bearing on innovative activity and the economy's level of technological sophistication. The government support is a major ingredient of the entire infrastructure.

The Israeli government has several plans to encourage entrepreneurship but these are not sufficient and often assist large companies more than young ventures (Trajtenberg, 2000). Without a doubt, the most visible program for furthering technological development in Israel is the grants program of the Office of the Chief Scientist (OCS). The funds available to the high-tech industry in general, and to high-tech start-ups in particular, primarily via the OCS, are an important cornerstone in the Israeli government policy of supporting entrepreneurship. Another governmental mechanism to encourage and support start-up enterprises is the incubator framework,

established by the Government of Israel in the mid 1990s. The main idea of the incubator program, which deals with young entrepreneurships organized in incubator parks, is to provide support during the first phase of a technological initiative, thus motivating the companies to commercialize their inventions after an initial two year period. Unfortunately, government policy supporting entrepreneurship is very meager in Israel in all aspects such as regulation, tax policy, policy of direct and indirect encouragement, quality of services and sympathy towards entrepreneurs and entrepreneurship. The frequent changes in the government policy, level of support and the bureaucracy create instability and hence uncertainty hindering entrepreneurship.

The Culture

Israeli culture at large supports effective success due to personal effort and encourages autonomy and independence as well as creativity, innovativeness and risk-taking by entrepreneurs. The Israeli personality seems very appropriate for the development of new products and less suitable for continuous maintenance which requires perseverance and accuracy. The attitude towards entrepreneurship and entrepreneurs is positive and highly valued in the society (Lerner and Avrahami, 2002).

Industry leaders say that the Israeli culture and the society have a leading role in fueling the high-tech community. Israel is a small country where everyone seems to know everyone else and one can drive almost anywhere in less than a day (Hausman, 2000). Israel has no unknown soldiers and no unknown millionaires.

- **The Economy**

The Israeli and the global economy status affect the accessibility of funds. As demonstrated in figure 2 during thriving economy the investment level available for start-up ventures at all stages is much higher as is the market propensity to test and procure new products. Developing a start-up is tough in a healthy economy; growing one through bust periods is heroic (Roberts, 2003).

> ***"To convince customers to spend money on an untested company, a start-up must demonstrate a compelling way to solve a serious problem. When the economy was better, a start-up might convince some people to spend money on it. Not today."***
>
> *David Gregory, CEO of ReShape Inc., Mountain View, CA. 2003*

The GEM report (Lerner and Avrahami, 2002) articulates that the global crisis in the economy, particularly in the high-tech and the political/security situation, greatly reduced the business opportunities during the last three

years. Both, the political and the security situation in Israel create a difficult situation for the high-tech start-up community. This is apparent in many aspects such as openness of foreign countries to visit in Israel and do business with Israeli companies as well as some apprehension on the side of the investors. Traston, Sarusi, Kochavi, Zisapel and Ayalon (2002) conclude that despite ups and downs in the economy Israel's high-tech has a bright future. The Israeli high-tech industry has only a small share of the global high-tech economy and hence has enough room for expansion even in a global high-tech contraction. Israeli high-tech will remain the main source for growth of the Israeli economy with no foreseeable substitute.

The overall trend in 2004 is back to increased investments in high-tech start-up companies including the seed stage. It seems that the high-tech activity is reviving after several years of contraction. Many of the bigger high-tech companies had to focus during the last three years on their core business and cancelled their expansion programs. This void creates a real opportunity for young ventures which are sought after by the giants. Many new ventures could be launched to fill the gap created.

A useful model to analyze the level that the infrastructure supports innovation is Porter's (1990) diamond model. Applying the model to the Israeli case can serve as a good summary to this section describing the influence of the external environment on the start-up future.

2.9.2 Infrastructure analysis according to the diamond model

A strong common innovative infrastructure requires national investment and policy choices stretching over decades. Porter's diamond model relates to the fact that innovation and the commercialization of new technologies take place disproportionately in cluster geographic concentrations of interconnected companies and institutions in a particular field.

Since Israel is a small country it can be treated as one cluster with some sub-clusters for high-tech start-ups in three or four geographical areas. As Schumpeter (1934) emphasized many decades ago, competition is profoundly dynamic in character. The nature of economic competition is not "equilibrium" but a perpetual state of change. Porter's "diamond" model, describes four broad attributes of a nation that shape the microeconomic environment in which local firms compete which affects overall competitiveness as well as innovation.

The four elements of a location's microeconomic environment are:

1. Factor conditions. The presence of high-quality and specialized input such as skilled labor and infrastructure, necessary to compete in a given industry;
2. Demand conditions. Pressure and insight gleaned from sophisticated domestic demand for the industry's product or service;
3. Related and supporting industry. The presence or absence in the nation of suppliers and related industries that are internationally competitive;
4. Firm strategy, structure, and rivalry. The conditions in the nation governing how companies are created, organized and managed, and the nature of domestic rivalry.

Nations succeed in particular industries because their home environment is the most dynamic and the most challenging, and stimulates and encourages firms to upgrade and expand their advantages over time.

To complete the "diamond" model theory it is necessary to consider two additional variables:

- Events that are not under the control of a firm (wars, technology breakthroughs, extreme demand conditions) which may influence the commercial progress of a specific company;
- Government intervention which can affect the other variables in the model. Some examples of such intervention are exposure to import, improvement of infrastructure, changes in the economical and investment policy and technological education.

The author utilized the diamond model to analyze Israel's competitive advantage, with the electronic industry a suitable representative of the Israeli high-tech industry. An analysis shows the following results:

- **Factor Conditions**

  There are a number of elements supporting the factor conditions. The outstanding factors are: The high number (relative to population) of scientists/engineers employed in R&D per capita (about 50% more than in the US) due to the high level of education infrastructure. The necessity to cultivate the technological defense industry and the strong relations between the academy and industry nurture the high-tech industry with new ideas and technologies. This quantity even increased with the latest wave of immigration. The Israeli melting point creates a diversified population commanding many languages. The influence of the army supports the high level of improvisation and provides a flow of educated

labor from the army to the civilian world. The decent availability of investment capital (including VC, see figure 1) supports the high level of investment in R&D, a total of about 2.3% of GDP in the late 1990s.

The obstructing elements for factor conditions are primarily shortage of new graduating engineers in some demanding fields and the increase in salaries during the last twenty years (eroding a previous gap relative to the western world).

- **Demand Conditions**

The major support for the demand conditions is the high-tech demand for sophisticated labor emanating from the defense sector and increasingly from the swiftly growing high-tech industry.

The major obstructing factors for the demand conditions are the small local market and the remote location from the main markets.

- **Related and supporting Industry**

The supporting elements for the related and supporting industry are the outstanding presence of international leading companies and the domestic presence of some meaningful internationally established companies (as discussed in paragraph 1.3.2).

The obstructing elements are mainly the fear of technology leakage through cooperation which limits the ability for useful cooperation between firms; the lack of marketing and intelligence resources; and the relatively shortage of "seed money" and support for the initial stage of marketing and market intelligence.

- **Firm strategy, structure, and rivalry**

Supporting firm strategy, structure and rivalry are professional and flexible management style; large number of small companies which enable dynamics and flexibility; Conversion of defense technology into the civilian market; and the tendency for adaptation of innovation and presentation of original solutions.

Obstructing this topic are the lack of knowledge and experience in international markets; and the acquisition of many small companies by international companies, a phenomenon encouraged by VC organizations, making swift profit realization while losing intellectual property and manpower (and probably not maximizing profit opportunities).

- **Other events**

The continued unrest in the region and primarily the Israeli Palestinian conflict increases the perceived level of risk among investors and customers. The advanced technology developed in defense organizations and some of the leading international and Israeli high-tech company supports the technologies developed in other high-tech companies including start-ups.

The government assistance in building the incubators technological incubators during the Russian immigration influx assisted the assimilation of the scientists and engineers among them and increased the portfolio of available technologies to the high-tech industry. The OCS funds are also a meaningful support to the R&D efforts in the high-tech industry in general and start-ups in particular. The tax benefits in rural areas of the country encourage and assist some of the entrepreneur to actively pursue their initiatives and establish new enterprises.

2.10 "Crossing the chasm"

"Crossing the Chasm" is Moore's (1991) interpretation of the technology adoption cycle. It adds an important insight: Moving through the stages of technology adoption is not necessarily smooth. Moore's model is based on the behaviors associated with technology diffusion. The diffusion model includes five main types of people who participate in the diffusion of new technology or ideas: Innovators, early adopters, early majority, late majority and laggards and the distribution of these types of people follows a standard bell curve. Moore (1991) has added more information to this early model by characterizing the stages in a slightly different manner. The innovators are technology enthusiasts, the early adopters are visionaries. The visionaries dominate the buying decisions in the market but the technology enthusiasts are the gatekeepers who realize the new product's potential. The early majority contains the pragmatists, the late majority are conservatives, and the laggards are skeptics. The pragmatists are the early majority of high-tech markets. They understand that the "leading edge" can often become the "bleeding edge". The conservatives (the late majority) are not too happy with innovations and buy only to stay on a par with the rest of the world. The skeptics – laggards - have just to be neutralized to minimize their influence.

From his experience in the high-tech industry, Moore (1991) notes that moving a group of buyers from the early market to the mainstream market can create a chasm that must be recognized to be navigated successfully.

Earlier adopters accept the risk of being early adopters and take longer to test the innovation than do later adopters. This can explain the reason for the chasm, or the cracks in the bell curve, as he defines it.

Leonard-Barton (1995) as well as Hamel and Prahad (1994) criticize the model for lack of integrating what is known to be sound business practice with evidence, either from case studies, or from personal interviews.

2.10.1 The competitive-positioning compass

One of Moore's (1991) models, "The competitive-positioning compass" (figure no. 5) describes four domains of value: Technology, product, market, and company. The domains of greatest value change with the technology adoption life cycle. In the early market, dominated by technology enthusiasts and visionaries, the important domains are technology and the product. In the mainstream, dominated by pragmatists and conservatives, the key domains are market and the company. "Crossing the Chasm" represents a transition from product-based to market-based values.

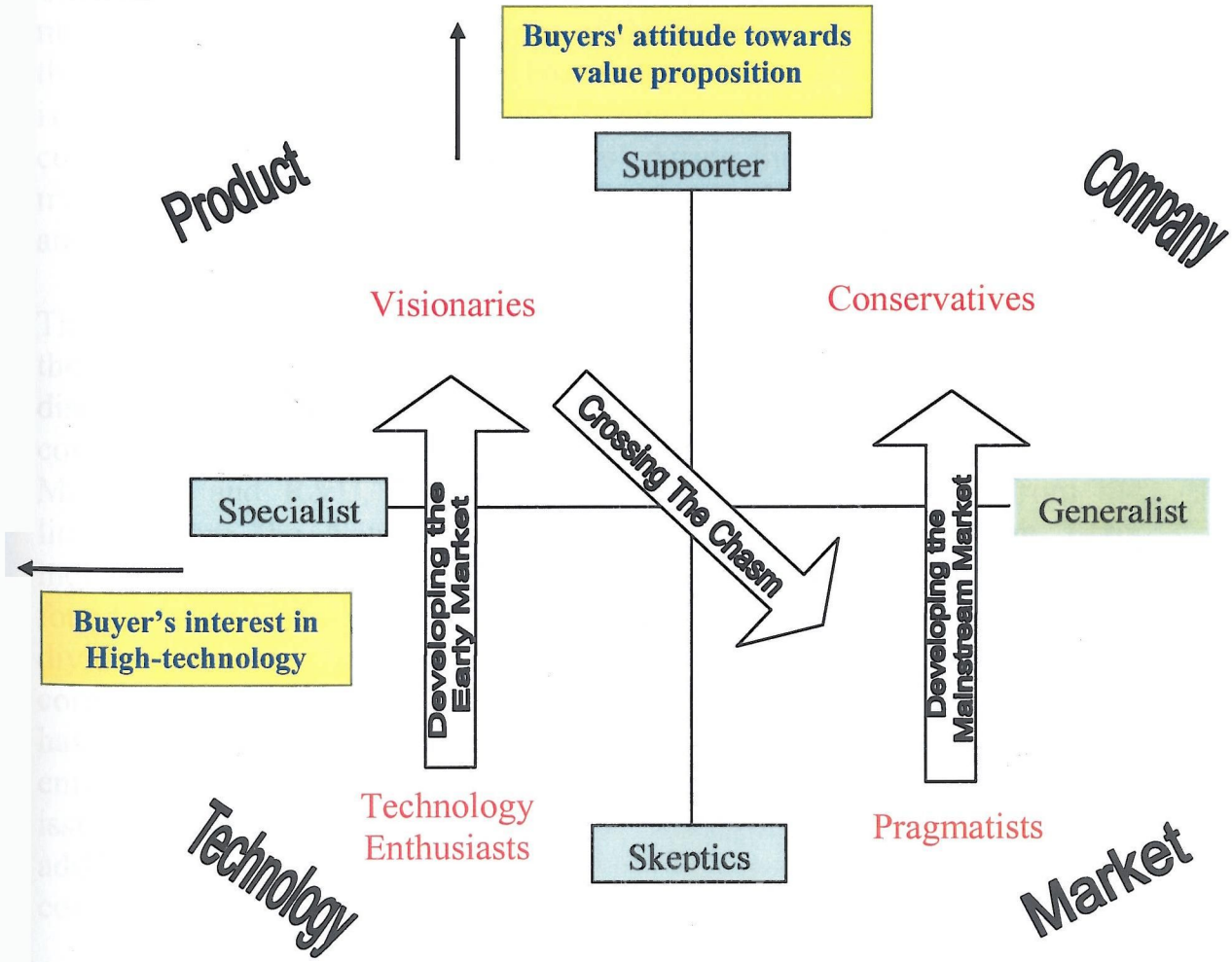


Figure 5: The competitive-positioning compass

When "crossing the chasm" the product is quite mature and hence is difficult to change. The focus should be on the potential applications and customers. The point is to appreciate how the product improves a customer's critical success factor with no comparable solutions.

This model can provide a base to explore the commitment and adaptation of high-tech start-up companies for long-term marketing to achieve business success.

"Crossing the Chasm" emphasizes the need the think about penetrating the main market. It is described here primarily to complete the research model dealing with the factors influencing success. In recent years most high-tech start-ups fought for their survival and engaged in short term success goals which made the research of the start-up activity to ensure successful "Crossing the Chasm" quite impossible at this point of time.

2.11 The Theoretical Model

The model in figure 6 dubbed "the theoretical model" is the expanded model and is based on the findings of the literature review. This model is the expansion of the basic model based on the literature review. This model is reshaped in chapter 4 to the final research model after including the data collected from the in depth interviews' during the primary research. The major parameters of each topic are included in the research questionnaire and analyzed in the findings of the primary research.

The evolution of the basic model into the theoretical model is manifested in the expansion of the model by creation of sub-domains for topics discovered as potentially having high importance. The product and the complete solution emerged as a separate key factor closely related to Marketing and R&D. Other topics that have been emerged from the literature are the Networking and the importance of the Core Team including the entrepreneurs/founders and the CEO which is often one of the founders. The Core Team seems to have a crucial importance and hence is divided into two separate areas: core team expertise and core team commitment. The way of organization is a managerial issue which can have an effect on the atmosphere and hence attitudes and motivation of the employees and has been therefore separated from other general managerial issues. The Core Team includes the managers but often also some additional key employees as senior R&D engineers and marketers, and key consultants not belonging to the managing team.

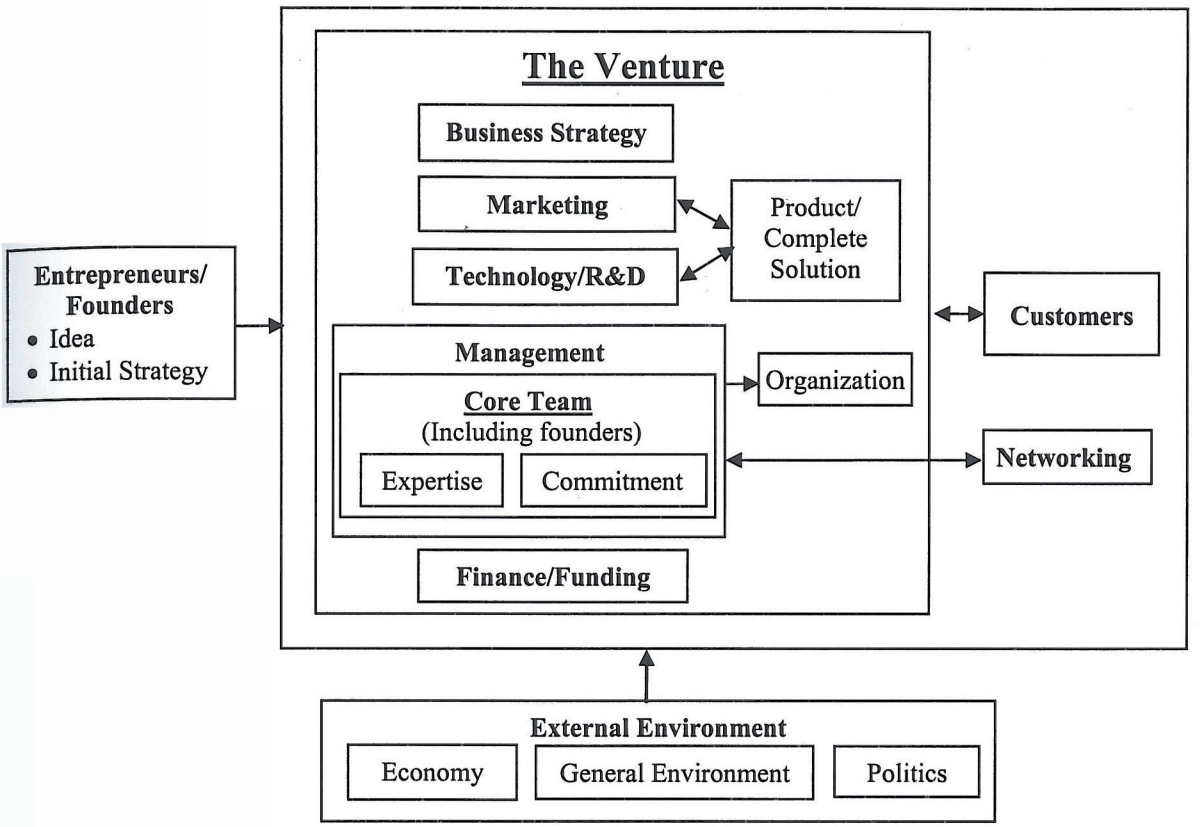


Figure 6: The expanded theoretical model

This chapter of the literature review revealed the main topics which could affect a high-tech start-up destiny. In each domain the subjects (parameters) of relevance were articulated. The literature review together with in depth interviews with start-up leaders and investors analyzed at the opening of chapter 4 supported the construction of the research model that describes the main aspects influencing a high-tech start-up (including some parameters specific to Israeli high-tech start-ups). The next chapter portrays the multistage research methodology.

Chapter 3 - The Research Concept

3.1 The research method

The study employed a multiple stage methodology described below.

Step	Procedure	⟶	Outcome
1	Literature Review		Identify the main topics and parameters influencing high-tech start-up success
2	Interviews & informal discussions		Expand literature findings with additional issues based on practical experience
3	Initial Model		Construct a preliminary questionnaire
4	Pilot Survey		Test Consistency and update the question
5	Final Questionnaire		Analysis of the open and closed questions
6	Final Model		Research summary, conclusion and recommendation
7	Model validation		Endorsement of the model and its ranking

The first phase of the study was a literature review with the main goal of obtaining a list of topics and their main parameters deemed relevant for success of high-tech companies and high-tech start-ups. The literature review has shown that there are many variables which may influence the success of high-tech start-ups companies in Israel. The variables were divided into a main group dubbed "topics" and sub-groups – "parameters" related to each of the topics. Some of these subjects are general and some are unique to the Israeli environment.

After the literature review the author employed an exploratory study. Exploratory studies examine the relationship between variables in order to increase understanding. Results obtained from this study will identify significant variables in the problem area as well as the potential area for further study. The exploratory study started with 14 in depth personal interviews, with leading persons in the high-tech start-up community. Interviews are the preferred strategy when "how" or "why" questions are posed and the researcher has little control over the events, and when the focus is on a contemporary phenomenon within some real-life context (Yin, 2003). The interviews were conducted with start-up managers and with investors. The sample represented leading managers of start-up companies engaged in different fields of activity and at different life cycle stage. The interviewed angel and VC investors are involved in several start-up ventures and thus represented a more general view of the Israeli start-up

phenomenon. The idea was to reflect on different aspects of start-up companies and investors to include both general and sectoral issues.

The main points guiding the interview included: the factors influencing high-tech start-up success; the influence of external factors (infrastructure, economy, security etc.) on the success and comments about the suggested models (towards the end of the interview). When talking to investors additional aspects were explored regarding the main features determining the investment decision; the recommended involvement level of the investors in the start-up activity, and the areas in which the VCs can assist the start-ups.

The interviewees represent the following characteristics:

- Three companies were very promising ventures valued at more than $100 million at their top and closed today;
- Three ventures are still operating (more than six years) and hope to flourish in the near future;
- One enterprise is focusing on a small niche market striving for profits but without plans or chance for fast growth in the near future;
- Three ventures were sold, one to a big Israeli company, one to a foreign company and a third to a US organization;
- The investors interviewed belong to three of the leading VC houses in Israel and an angel who spent dozens of million dollars on high-tech start-up ventures.

The in depth interviews helped to understand the processes of the start-up companies, to analyze and evaluate the findings (what separates success from failure). The main goal was to validate the applicability of the topics and parameters and to detect additional parameters that were not discovered during the literature review and should be integrated in the research model. The accumulated data in the literature review and the interviews provided the basis to the identification of apparently main topics and their relevant parameters and the construction of a provisional research model.

Thereafter the provisional model was operationalized into a survey instrument. It was applied as a preliminary questionnaire pilot survey at face to face interviews with respondents of twelve diverse start-up and experts. This format was intended to facilitate comprehensive feedback. The purpose of the pilot was to refine the research instrument; overcome any lack of clarity and ambiguity; establish reliability and discover any missing issues. The questionnaire was tested for consistency (Cronbach α)

and was modified in several steps to achieve the final questionnaire version (see appendix 2).

The next step of the final questionnaire (see appendix 1) included 42 questions and sub questions and contained the 15 model topics having multiple item sets of questions for each dimension. It also included many open ended questions intended to tap into different types of responses and to generally enquire about issues that could not be implemented in close questions or items that were not anticipated. The final questionnaires were distributed with personal contacts and with the assistance of organizations such as the Israeli Center of Management, MATI – the Israeli Institute Fostering Entrepreneurship, ISEMI - The Institute for the Study of Entrepreneurship and Management of Innovation, RDC – Rafael Development Corporation and some friends. It was intended primarily for leading figures in the start-ups, i.e. CEO or Vice President who have an overall view of the history and current situation of the venture's business related issues and the present and future plans and strategy. The survey was completed by the CEOs or VPs of 69 high- technology start-up companies and by 10 Venture Capitalists or consultants.

Since Israel is a small country it is treated as one homogeneous cluster. The sample population for the interviews and questionnaires was selected from all over the country. Most of the start-up community is concentrated in central Israel near Tel Aviv, but the northern part near Haifa has also a significant amount of high-tech entrepreneurship activity well- represented in this study.

After receiving the responses the data was analyzed qualitatively to investigate any unanticipated elements or patterns. This facilitated the effort to analyze major subjects that couldn't be incorporated in the questionnaire in the form of closed question format. This was followed by a statistical analysis of the findings, to establish a ranking of the topics and the major elements within each topic which were deemed critical and those seen as less important. A complementary step was a process of model validation. About half of the respondents were asked to consider the final model and its topics ranking. The response rate was 40% and the total of 16 verifying responses were received and analyzed.

The final step of the research was to write the summary, conclusions and recommendations of the research.

Chapter 4 elucidates and analyzes the primary research findings and constructs the preliminary research model.

Chapter 4 - The Empirical Research

This chapter presenting the empirical research is divided into three parts. The first part summarizes the interviews conducted in order to establish the final research model which afforded the basis to construct the questionnaire and the model itself. The model with all its topics and parameters is introduced.

The second part offers the descriptive statistics, including a numerical and graphical presentation of the diverse research variables using simple distribution and distribution indices.

Part three presents the inference statistics, using the relationships between the research variables and statistical analyses adapted to the type of variables. This study employs analyses according to Pearson's correlation coefficient, t-test for exploring variance, cross tabs and one-way ANOVA tests.

4.1 Analysis of the interviews

The interviews (short case studies) of the start-up companies are described in appendix no. 5 and the interviews with VCs and the Angel investor are described in appendix no. 6. The summary of all the interviews is presented in appendix no. 7. Next is a succinct description of the main issues revealed in all interviews which also appear in a table format in appendix no. 8.

The respondents mention the Strategy as driving the course of the organization. The business plan has to be clear and based on realistic market needs. The industry analysis and SWOT analysis are the basic tools on which the strategy has to be constructed. A major fault of many start-ups is the focus on technology and not real opportunities while realizing their venture strengths.

The Core Team expertise, diversification and harmony are essential for success. Many angels and VCs emphasize that a critical factor in their investment decision is the assessment of the core team. Very often start-ups are founded by young people who don't have management skills, experience or appreciation and don't hire adequate managers. This causes big difficulties in the R&D and marketing processes. At certain stages consultants can be a useful tool in areas in which the start-up has a lack of expertise.

In this research the CEO was not dealt as a separate issue but as part of the core team. It is clear that the CEO has a dominant effect on the venture. He leads the organization, defines the culture select the core team and makes the crucial decision. It is a big advantage if the CEO has former experience in high-tech start-ups and leadership personality. Most mistakes are hard to be tolerated in a young organization with limited resources. The CEO can sometimes hinder the start-up success and despite the many difficulties involved should be replaced in time.

Selection of the human resource, most of them skilled labor, has to be done with much deliberation. Because of the small size almost every employee has a solid effect on the start-up accomplishments.

The "Bubble" period "suffered" from surplus of "hot" Venture Capital funds which had to be invested and caused lack of professionalism in the investing entities. The investors were part of the board of directors but did not have the capability to assist the start-up in areas it has a lack of capabilities. Today the time has changed and we experience much more professionalism within the investing community and high selectivity of investing decisions.

Since most start-up stem from engineers and scientist the belief that a good product will sell was very strong. Marketing is not always seen as a profession and the founders (very often not having any marketing background) undertake the marketing missions. A sound marketing strategy based on thorough knowledge of the market intricacies is crucial for success. Focusing is probably a key feature; knowing the markets and selecting the starting market niche in terms of products and geography while continuously updating the marketing strategy are key elements in the marketing strategy. There is a strong need to treat marketing as one of the critical fields which should be staffed with the best professionals and not dealt as an area for savings. The venture has to contemplate the composition of the marketing team and their geographical locations. Very often external consultants can assist in accessibility to customers and other marketing efforts. It is recommended to avoid (at least at the outset) products that need to educate the market or those who establish new standards in the markets, since it requires a lengthy and resource demanding effort. Regulated markets can pose a great obstacle. There is a need to support the distribution channels.

The product should provide a complete solution (if not sold to OEM) and has to meet real needs and provide good quality. A product that can be

easily adapted to different needs (due to geographical, climate or cultural differences) is a big advantage. The focus on a product or product family is critical to avoid wasting resources. The best structure could be a product that on one hand is not too revolutionary or sophisticated for use but on the other hand based on new technologies creating entry barriers for competitors. A product originating in Israel is sometimes seen as a shortcoming hence the product has to be superior in its benefits as well as in operation and quality. It is important to verify that potential customers are able and willing to pay the intended price.

The customers are the buyers of the product and without being close to the customers, understanding his needs and implementing their feedbacks there is a low chance to be successful in the market place. Approaching customers should take in account cultural differences. A high level of service is necessary in order to retain loyal customers.

R&D should take advantage of the unique technologies existing in Israel and the skilled workforce available in the Israeli labor market. New breakthrough technologies require careful analysis to determine adequate timing for market launch. Shortcuts in R&D should be avoided. R&D expenses are often underestimated causing difficulties to raise more funds (lack of confidence fro the investors). The communication between R&D and marketing should be monitored and fostered.

Strategic alliances with key customers, other companies or marketing organizations are often the key for success. They can assist in R&D and, more important, can bring the complete solution to the market in the right time and with the appropriate means. Securing alliances or cooperation at an early stage could be a major asset for a young venture.

Funding has to be timed correctly since the changing economy can make it very difficult. The big wastes of the "bubble" period have to be avoided.

Investors who were expected to be professionals and have a meaningful added value turned out to be a big disappointment. Instead of assisting in Strategy and direction while opening the markets for the start-up they became an obstacle. The greediness and lack of professionalism has probably changed dramatically in the last three years. Some investors are very involved in the start-up life and a fit between the investors view and goals and the ones of the enterprise can be crucial.

Regarding the external factors, the start-ups have to adapt to the changing economy. The funds are limited and investments are scrutinized carefully. The big advantage of workforce due to the army service which enhances the creativity and improvisation capacity should be exploited. Also the globalization trend could be utilized as an advantage.

4.2 The research model - The key elements for high-tech success

Based on the literature review and the interviews, the topics and their parameters were analyzed and the research model was constructed. The following step was the questionnaire survey enabling to analyze the topics and their parameters and establish the final model highlighting the important topics and parameters. Henceforward is a description of the main issues accumulated from the literature review and the interviews. Following is table 4 which summarizes all the topics and their associated parameters. The parameters of each topic are those remained after the pilot questionnaire and interviews were analyzed and the parameters deemed to be less relevant were eliminated.

4.2.1 The key elements

The literature review and interviews revealed fifteen major topics that are influencing the destiny of a high-tech start-up company. The topics and the important parameters that provided the basis for the preliminary model and the research questionnaire are described below. The topics were divided into a set of internal factors which are controlled by the company itself and a set of external factors which the start-up can not control but have an indirect influence on the start-up.

Internal factors

The first topic relates to the Idea behind the enterprise. The Idea main parameters are the extent it meets customer needs, the uniqueness and the ability to be presented in a succinct and clear formula.

The Strategy of the business entity is the organization's compass which creates the direction and sets up the goals. Some of the strategy main parameters are the mission statement and the analysis of the industry (including future trends and foreseeable competitors). Other issues are the level of flexibility of the strategy, the revisit and update of the strategy and the notion of creating a company and hence a strategy for the short or long run.

The Core Team is the skeleton of the organization. The expertise of the Core Team can be measured by its experience, level of multidisciplinary

ability, and leadership capability. The commitment of the leading team is influenced among others by its identification with the goals and motivation. The investors are part of the board of directors and therefore have a decisive role. It is important to find out what is their role and the possible contribution. Although the Core Team has to be as complete as possible experts can assist the leading team and might be valuable at particular stages and field of expertise.

The start-up can have different methods of Organization. It can be more formal or informal and be constructed with various hierarchical levels.

The marketing has to provide the road map and means to reach the customers in the target market. The relevant issues in this topic are the importance of a solid marketing plan, profound knowledge of the market place, and the follow up of the dynamic changes in the market and performing the required adaptation. Related to this are subjects such as market research and assessment of the market size, growth potential and possible profits. In the case of Israeli high-tech start-ups it involves penetration of international markets and in some cases steering the market into new standards which entails market education. Intellectual Property and patents are relevant also relevant subjects when dealing with high-tech organization.

The marketing strategy can be based on different types of products. The products can be aimed towards a wide market or a well defined niche market. Some of the main products features are the product positioning, the perceived utility when arriving in the market and the distribution channels. All these influence its acceptance into the market. The company has also to consider early planning of penetration into the main market (crossing the chasm) or focus on the early adapters and leave the main market for later stages. Although R&D has to develop the products that the marketing department requests Marketing and R&D are not always coordinated.
The marketing team can be combined of local personal and/or overseas employees and its location can be domestic and/or in the main market(s).

Selling the products to customers is the ultimate goal of the ventures and a necessity for success. Some parameters that are relevant in the relationships with potential/existing customers are the knowledge of their real needs, the buying behavior and the readiness to buy the products. In many cases loyal customers who do continuous sales are very important and the implementation of customer's feedback can have an impact on current and future customers.

The management style and the solidarity with the enterprise influence the atmosphere and motivation of the employees. Plans for employee team development can also encourage their identification with the company. Since a startup is a small organization every employee has an valuable role and the cohesion of the entire group of employees strongly influences the final results.

Since the start-up organization is small it often needs some support which can be achieved via networking. Some examples can be assistance in approaching the market and technology.

The R&D team has the role of completing the required products. Several issues are related to the team among them, the quality of the team itself, the level of innovation and capability to have a breakthrough in the technology of the developed product. Some specific to Israel subjects are the availability of skillful manpower and the influence of the vast defense technology. The development of the product can focus on different matters such as the final price (to enable competitiveness), the durability of the product and the flexibility of adaptations to different customer (market niches) whilst considering the affect of these on the pace that the product will arrive in the market.

The "Complete Product" or "complete Solution" deals with all the surroundings to enable the customer to utilize the product with full satisfaction. These include all the integrated logistic support required (technical manuals, spare parts, distribution, etc.) The product can be offered as a part of a complete solution or as an independent self contained full solution. The complete solution can sometimes be achieved by cooperating with partners for R&D, marketing or other purposes.

Funding is the oxygen that enables the existence of the start-up as long as it has not achieved sales that yield profits. There are different sources of funding and each source might have different interests in the venture. A subject that has to be considered is the timing of fund raising and the goals which can include the penetration of the main market.

External factors

There are three major domains in the external world. The first is the special Political Situation of Israel with its unique political environment and security situation. The second domain is the General Environment which includes again the specific situation of the country in relation to area such as education and training for entrepreneurship, the influence of the military

service, government policies and programs, the internal market openness, availability of skilled human resources and social/cultural norms. The third domain is the Economy. The global and domestic economy affect the start-up in terms of funds availability, the diffusion rate of new technologies and similar aspects.

Table 4 lists the main topics and their parameters included in the research model. These are all the items collected and those who remained as relevant and important after completing the comprehensive steps of literature review, interviews and pilot questionnaire adaptations

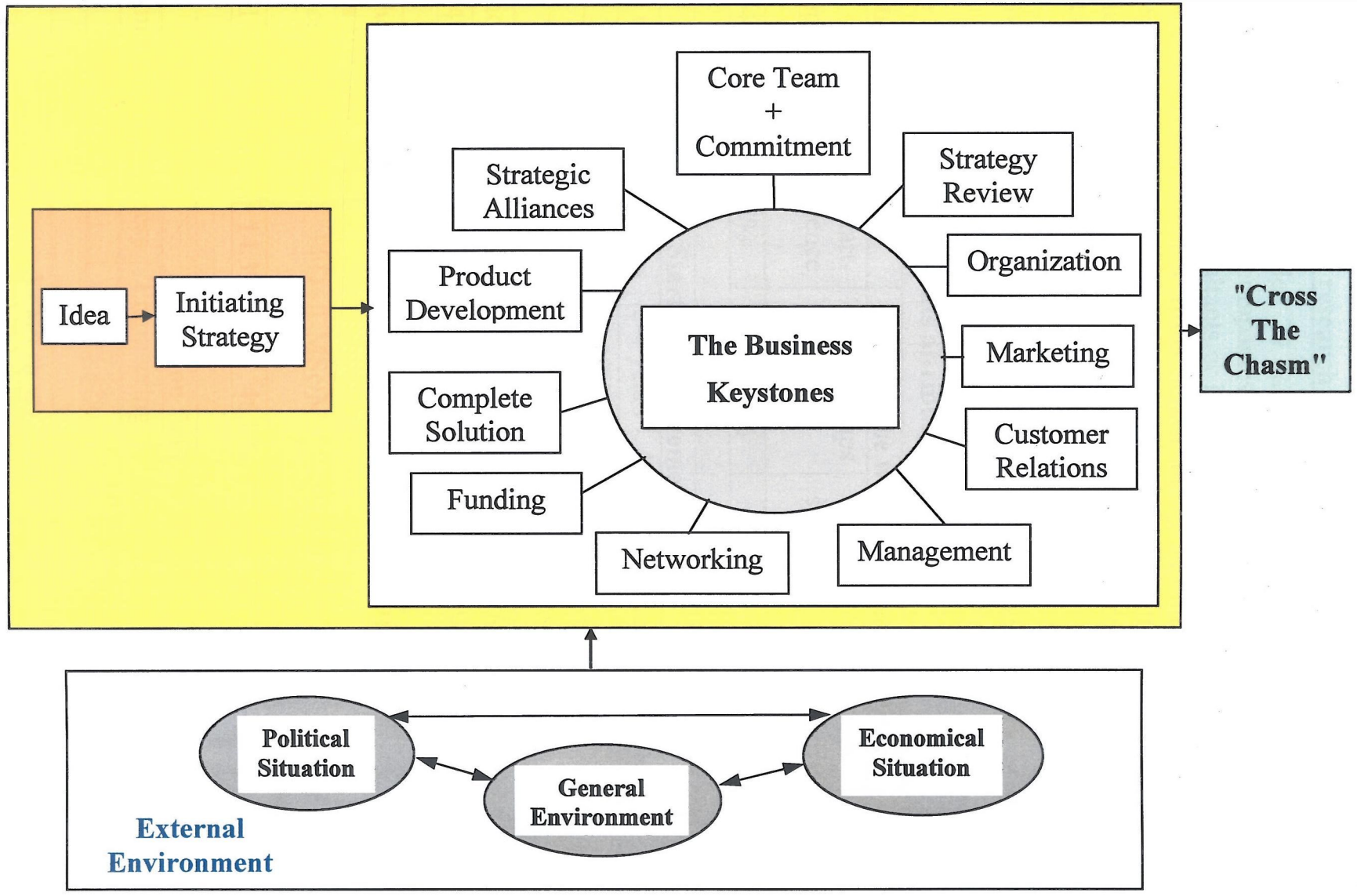
Figure 7 depicts the preliminary research model and includes all the topics described above.

Table 4: The main topics and parameters included in the research model

Idea
Idea formulation and level of clarity
Idea meets real customer needs
Strategy
Mission statement
Industry analysis including future competitors and trends
Clear Strategy from outset
Continuous revisit and update of the Strategy
Open Question: Long Run Strategy or R&D for Acquisition Strategy
Core team expertise
Team Diverse and multidisciplinary experience
Former experience in previous start-ups
Team leadership capacity
Using expert consultants at least in certain stages of the start-up
Investors contribution in main venture functions
Open Question: Where can the investors have a meaningful contribution?
Core team commitment
Identification of the core team with the start-up goals
The motivation of the core team
Organization
Clear definition of employee responsibility domains
Few organizational levels
Open Question: Is it preferred to have a formal or non formal organization?
Marketing strategy
A wide-ranging acquaintance with the market
A reliable and solid marketing plan based on real and accurate information
Implementation of market research
Assessment of the expected growth and profits in potential market(s)
Establishing new markets while defining new standards
Organization to penetrate international markets (staff, offices etc.)
Permanent market follow-up and re-organization to deal with market dynamics
Patents registration
Product perceived utility (product importance for the customer)
Developing and supporting distribution channels (already in the R&D phase)
Product positioning
Reciprocal relations between marketing and R&D departments
Early recognition of the main market and planning of main market penetration
Open Question: What is the preferable strategy for a start-up, to develop a product for a wide market or focusing on a well defined niche market?
Open Question: should the leading marketing team will be located in Israel or overseas?
Open Question: Should the leading marketing team be Israeli, foreigners or a mix?
Human relationship
Personal acquaintance of the customer and his needs
Understanding customer's buying behavior
Implementation of customers' feedback

Market receptivity for the start-up products (readiness to absorb the products)
Opportunities for continual sales (Creation of a captive market)
Management in general
Management style
Team solidarity within the enterprise
Employee team development
Networking in general
Open Question: Which domains are important for networking with outside people who can assist the start-up? Finance, Management, Technology, Law, Marketing.
Open Question: Any additional aspects important for strong start-up networking?
R&D capability
Technological manpower availability in Israel
Technology stemming from defense industry
Quality of R&D team to achieve the goals
Product level of Innovation
Technological breakthrough implemented in the product
Easiness of adaptation to different international markets' requirements
Product quality and durability
Product price
Product arriving quickly in the market (importance of time to market)
Complete solution
A product which is a device/gadget (not a complete product)
A complete and competitive solution (including ILS etc.)
Cooperation in R&D aspects to achieve a "Complete Product"
Cooperation in marketing to achieve a "Complete Product"
Funding Type
Open Question: Which groups of investors are important in funding high–tech start-ups: Venture Capital, Private Investors, Friends/Family, Other firms, Government Support
Open Question: Is it important to raise funds enabling to penetrate the main market (Crossing the Chasm, after penetration of the initial market) at an early stage of the venture?
Open Question: Is it preferable to raise the financing of a start-up when possible and available or when needed?
Political situation
The Israeli political environment
The security situation in Israel
General Environment
The influence of the military service on the quality of Manpower1
Entrepreneurship education and training
Availability of skilled workforce
Government policies and supporting programs
Social and cultural norms
Economy Situation
Global economy
Domestic economy
Availability of financial and other resources

Figure 7: The research model – The success factors for high-tech start-up success



4.3 The attributes of the research participants population

The research sample included 79 participants, of who 69 have (or had) senior positions in start-up companies, while 10 are "experts" in the high-tech start-up industry (consultants or investors) and are not involved in the daily management of such firms. From the group of "experts", four questionnaires were completed by key figures in venture capital funds, affording the main source of funding for start-up companies, and six by experts/advisors in the field of high-tech.

The following table (Table number 5) depicts the characteristics of the start-up participants (according to part D in the questionnaire).

Table 5: Research Participants attributes

Start-up experience		**From those with previous experience**		
First start-up	Previous start-up experience	Two start-ups	Three start-ups	four start-ups or more
34.8%	65.2%	35.7%	38.1%	26.2%

Start-up involvement				
Less than a year	1-2 years	2-4 years	4-8 years	More than 8 years
2.6%	7.9%	17.1%	39.5%	32.9%

Position in the start-up				
President/CEO	VP marketing	VP R&D	Marketing Manager	Other
49.2%	21.6%	10.8%	3.1%	15.3%

Is the respondent a founder?		**Respondent education**			
Yes	No	PhD	MSc/MA/MBA	BSc/BA	Technical High School
61.5%	38.5%	14.3%	46.8%	29.8%	9.1%

Education field			
Engineering & Business	Engineering	Business	Other
29.2%	47.2%	18.1%	5.5%

Years in start-up				
Less than a year	1-2 years	2-3 years	3-5 years	More than 5 years
9.1%	19.7%	15.2%	36.4%	19.6%

4.4 The attributes of start-up companies that participated in the study

The start-ups represented in the research are in different stages and exist different periods of time (some are already closed) and different size (most have less than 100 employees, which is typical for start-ups) and reflect all the main sectors typical to Israeli high-tech start-ups. Their distribution is very similar to the distribution of funds invested by VCs during 2002/03.

The following graphs present the attributes of the start-up companies that participated in the study (n=69).

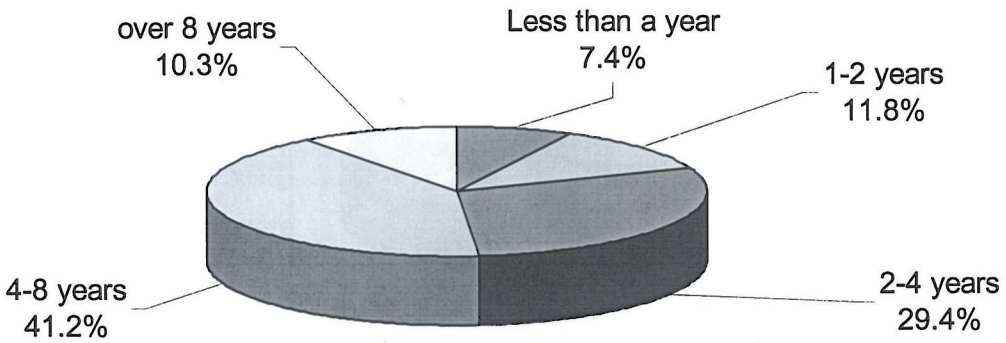


Figure 8: The distribution of start-up companies according to their age as registered companies

About 20% of the companies were founded during the two years that preceded the research, 29.4% were founded 2-4 years earlier, 41.2% have existed for 4-8 years and 10.3% have been in existence for more than 8 years.

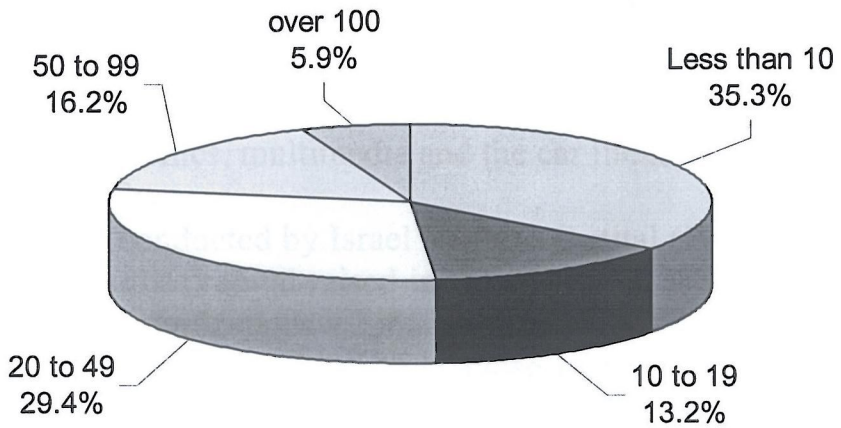


Figure 9: Distribution of start-up companies according to the number of employees

Almost half of the companies have fewer than 20 employees. About 30% of the companies have 20-49 employees and 22% of them employ more than 50 people. Many start-ups had more employees and had to shrink their size at the beginning of the century. Some survived with constant adaptation of manpower and some have closed after downsizing. Today only start-ups that have reached meaningful indicators for success, and are most likely next to IPO will employ more than 50 employees.

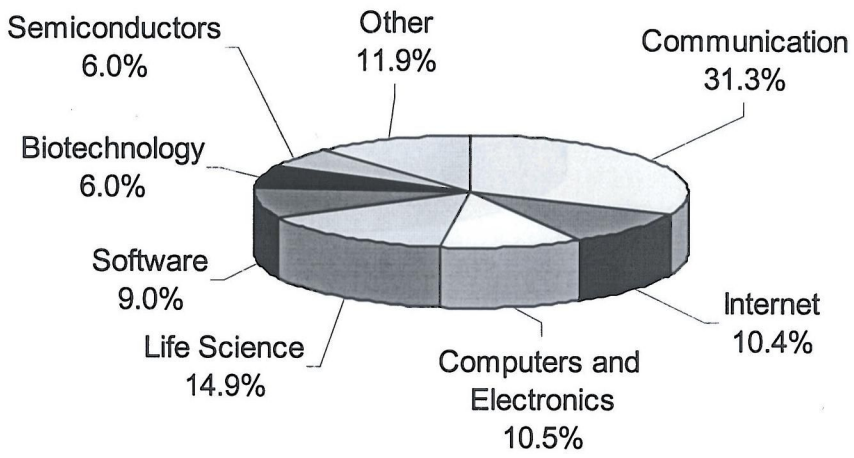


Figure 10: The distribution of start-up companies according to their area of involvement

A large share of the participating companies (almost a third) represents the communications sector. Other sectors are life sciences (14.9%), Internet (10.4%), computers and electronics (10.5%), software (9.0%), bio-technology (6.0%), semiconductors (6.0%) and other (11.9%). This latter includes fields such as printing machines, air conditioning, solar energy, data security, mechanotronics, multimedia and the car industry.

An Israeli VC survey (conducted by Israel Venture Capital (IVC) Research Center in 2003) shows that capital raised in Q3 2003 was according to the following sectors: Communications - 31%, life sciences – 16%, Internet - 10%, software - 9% and other - 34% (very close to the research sample when all sectors not specified are included in "others").

The following chart shows the distribution of companies according to the stage at which the company is (or was when closed down):

Development: Almost 20% are at the development stage.
Sales: A large group (almost 30%) started sales.
Growth: only about 15% are growing. 7.5% are at the high growth stage, 3.0% are profitable and 4.5% are profitable with growth. High growth means that the growth of sales is above 20% annually.
Decline (surviving or closed): about 28% are at this stage.
Similarly, 7.5% (n=5) reported their status as "other".

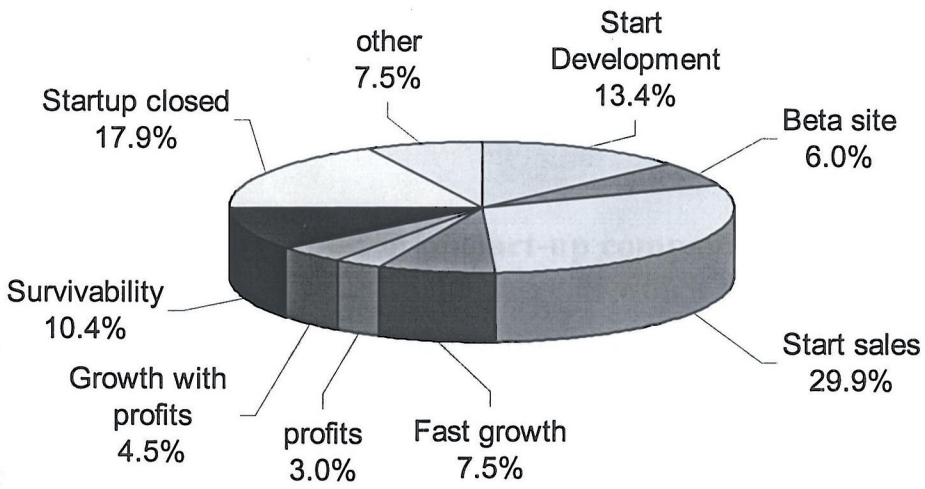


Figure 11: The distribution of start-up companies according to the stage at which the company is.

In order to analyze if there are any differences in ranking of the topics between companies in different stages, the companies were divided into three categories on the basis of the stage at which the company is.
Young companies: Those at the start of their journey: Start development or already having a Beta site.
Successful companies: Companies with growth and profits, profits, fast growth, first or more sales made.
Closed/Survive: Companies that are closed down or are hardly surviving.

The distribution of companies according to the above division is presented in the following chart.

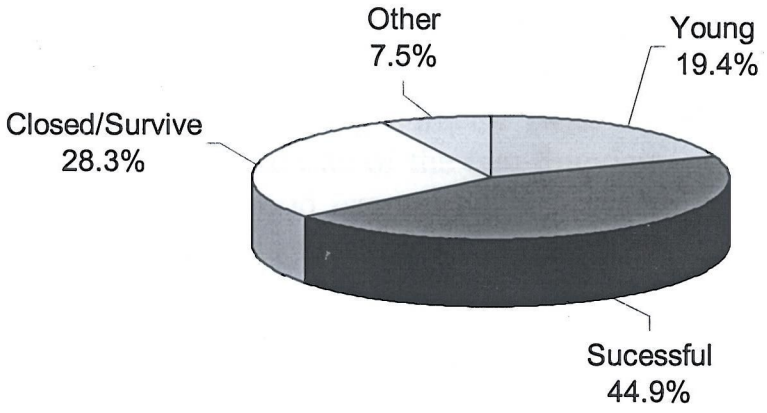


Figure 12: The distribution of start-up companies according to groups of categories of the stage at which the company is

About 45% are defined as successful companies, while 19.4% are in the "young" category. About 28% belong to the closed/survive group.

Successful and Unsuccessful Companies

Question 11 in Part A (Do you consider the start-up as successful?) related to the perception of the respondent about the success of his company. Despite the effort made to separate the successful from the unsuccessful companies, sometimes there is no compatibility between the replies of the respondents and the opinion of the majority regarding the company status (part A, question no. 11) and the situation in which a successful company should have been according to the number of years of its existence (part C, question no. 5). Almost half, for example, of the respondents in companies over four years old that defined their companies as successful are at the start of the sales stage. This is despite the fact that companies at this stage of their lives are supposed to be, according to the large majority of respondents (including those who defined their companies as successful) at the stage of profitability with growth (or at least rapid growth). There are also several 2-4 year old companies that are defined as successful but still had no sales, although the majority defines "successful" at this stage of their company life, a company that has at least started sales. A possible reason could be that the company's leaders tend to optimistic and declare success even though their company does not meet their own criteria for success.

A test case was conducted in one company where three people were asked to describe whether or not the company is successful or not.

1. The incumbent Managing Director (of 18 months) stated that the company is successful;
2. A deputy director general who serves the company for about 6 years (almost since it was founded) maintains it is not successful;
3. The previous Managing Director (who was also the first), who was also the leader and one of the two founders, noted that one cannot be sure. This is a good example of a situation encountered very often, with the absence of an unequivocal answer during the lifetime of a start-up company.

It is important to note that the period of operation undoubtedly influences the company's definition. Companies that managed to survive the economic recession of the last three years, for example, can recover and be successful (although one should wait another two years to determine their condition). In contrast, at the end of the 90s, a four year company and older, that couldn't show sales with growth, would almost certainly shut down after consuming its capital (or even prior to that).

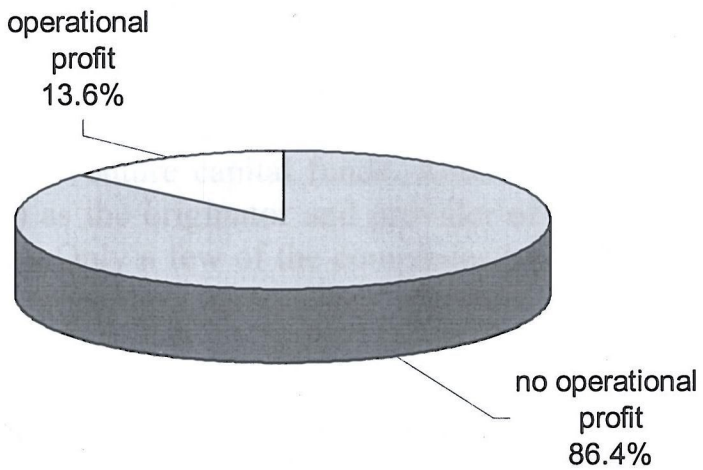


Figure 13: The distribution of start-up companies according to their operational profit

The majority (86%) of the respondents reported that their companies have no operational profit. Only two companies of the profitable group are growing and prosperous, with a considerable chance for them to become leading high-tech companies. The other companies in this group are small, with low sales. These are not necessarily growth companies that can serve as a model for companies striving for a large commercial success. One company which had operational profit has already closed down and therefore can definitely not to be considered "successful".

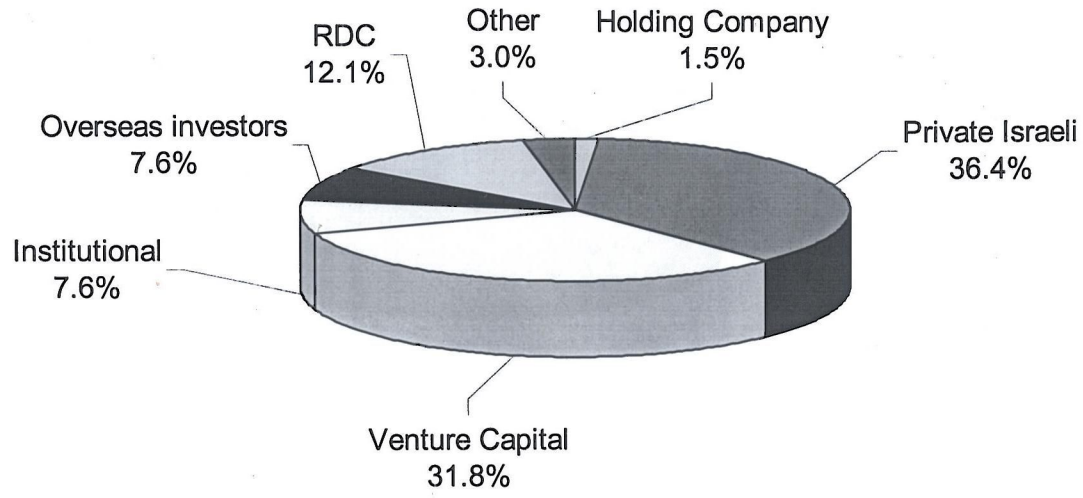


Figure 14: The distribution of start-up companies according to the major investors

The two main sources of funding for start-up companies are individual Israeli investors and venture capital funds. About 12% of the companies had RDC (see 3.2) as the originator and provider of the initial funding of the start-up venture. Only a few of the companies reported other investors, such as holding companies, institutional investors, foreign investors or "others".

It should be remembered that there are usually several investing entities. As example, in companies that RDC initiated and established, RDC was noted as the major investor, despite the fact that most of the investments at later stages came from venture capital funds. In general, most of the larger and more veteran companies (more than two years old and having recruited more than $1 million) contain VC investments.

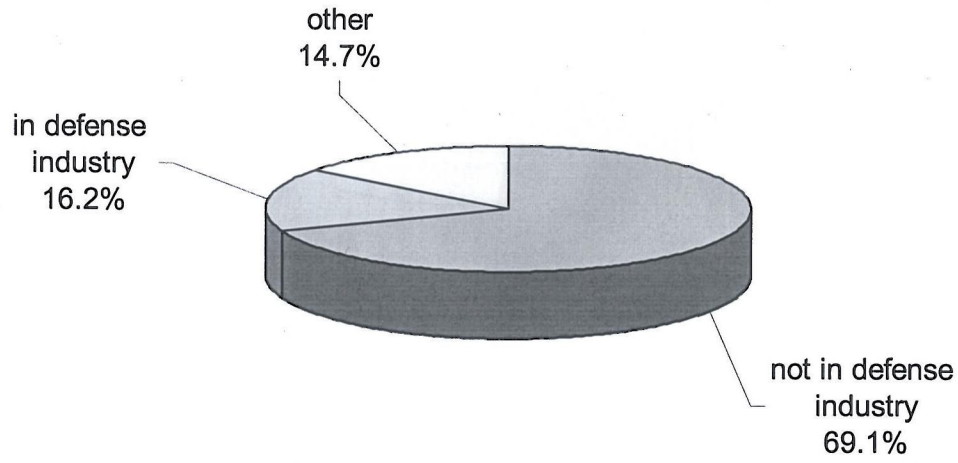


Figure 15: The distribution of start-up companies according to the technological source

Only one out of six interviewees reported that his start-up company utilizes defense technology. In the "Other" category, some technology or the professional experience stems from the defense industries. Although the majority doesn't consider the technology as stemming from defense it might have an indirect effect. In many cases the military service of some of the employees could have an effect on their knowledge and ability.

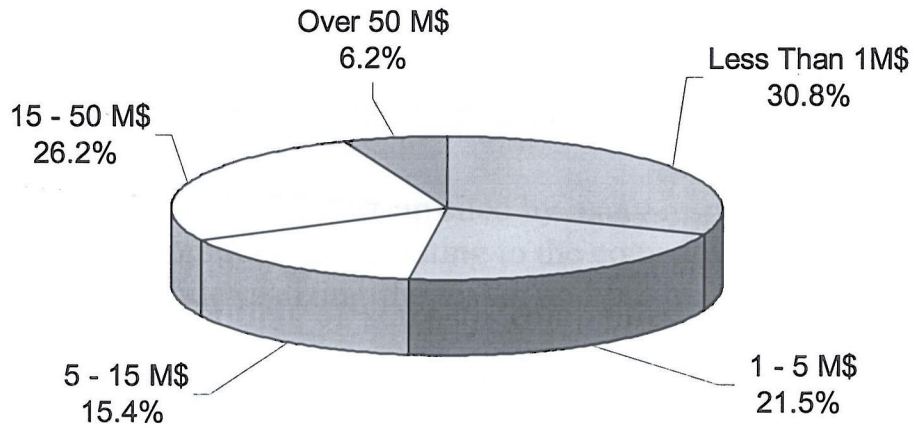


Figure 16: The distribution of start-up companies according to the amount of capital recruited (in $millions)

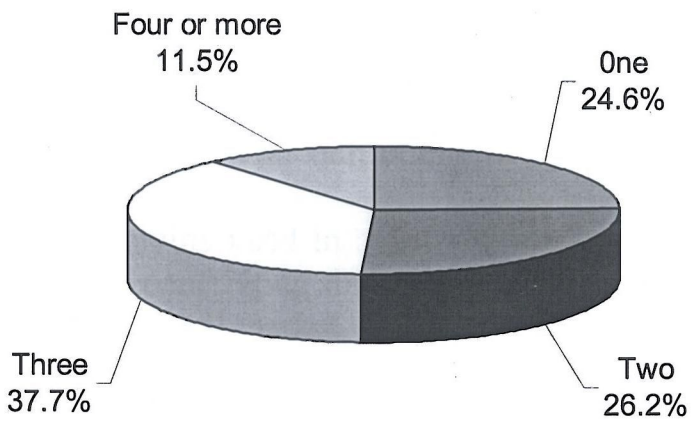


Figure 17: The distribution of start-up companies according to the number of capital recruitment circuits

In relation to raising of capital the start-up companies can be divided into three groups similar in their size (between 30% to 37%). The first group recruited less than 1MUS$, the second between 1-15 MUS$ and the third raised funds in excess of 15MUS$. About a quarter of the companies had only one round of fund raising while all the others have been successful in raising additional funds. Additional fund raising provides mostly some evidence that the start-up has attained some achievements, but since many of the companies raised money in the greedy and affluent bubble period it was not always confirmation for success. Timing appears to be an important factor in raising funds. During prosperity funds are more available than during meager periods.

4.5 How do you define a successful high-tech start-up (Part A, question 12)

The definitions for a successful start-up cited by many responders were:

1 Development of products contributing to the company, its employees and customers while realizing the vision and the business objectives (16 responses);

2 Perseverance towards growing sales while generating profits as early as possible (10 responses);

3 Passing all the basic stages, such as fund raising, product development (including testing in the company and with pre commercialization customers - ß site), survivability in lean years in order to achieve success in the market and profitability (12 responses);

4 Technological capability enabling implementation of a profitable and needed product (7 responses);

5 Achieving the company's defined goals within the planned time schedule (8 responses).

Various additional aspects and definitions of start-ups were mentioned. They include:

- Identifying a genuine need in a defined market (niche), generating a unique solution, penetrating the market, achieving continuous growth in sales to the targeted market, while increasing the market share until dominance and obtaining growing profitability;
- Continuous improvement of development pace, sales and value. Raising sufficient funds for the entire scope, to avoid survivability struggle and finally achieving significant profits to the investors and handsome compensation (value) for the employees (much above the traditional industry);
- Start-ups are companies which create a continuous commercial value with a good growth potential, and achieve financial equilibrium in a reasonable timeframe;
- Start-ups should succeed at the first round of product development while maintaining high value for the investors. Establishing a strategic partnership based on a unique technology satisfies a clear need while assuring an initial market niche.

For the detailed analysis of the responses please see appendix 4.

As this study identifies, there are many elements required for successful high-tech start-ups. The final success is probably measured by the results. A successful start-up will have constant and dynamic changes until it matures (or is acquired) and then considered as an established company.

Based on the responses the main points describing a successful start-up may be summarized as follows:
Penetration and expansion in a defined market with a self developed product which provides a sound solution to a real need yielding growth and profits.

4.6 How do you define a successful high-tech start-up in its different stages

The respondents gave definition to the stage a successful start-up is expected to be relative to the period it exists (Part C question 5). The following table illustrates the distribution of the respondents' answers.

Table 6: The start-up stage relative to its existence period

start-up Existence (Years)	Secure R&D Funds	Secure R&D and Mktg Funds	Beta Site	Start Sales	Sales by Plan	Strategic Partner	Profit	High Growth	Growth with Profits	Survive	Other
Up to 2	9%	25%	37%	27%							2%
2 - 4			3%	26%	29%	27%	14%			1%	
4 - 8				3%	8%		5%	20%	60%	2%	2%
> 8				3%	3%		9%		80%	2%	3%

In the first two years the respondents' expectations are that at least enough capital for development (and preferably also marketing activity) will be raised. But many (37%) believe that a successful start-up should already be engaged at a β site and 27% think that a successful start-up should already start its sales during the first two years of existence.

During the second two years the minimum expectations are that the start-up has started sales preferably according to the plan but many see a strategic partner as a key issue. Only few respondents expect profits but most of the respondents who stated that a start-up should have a strategic partner also mentioned that it should have started sales. In other words, more than 80% agree that a successful start-up at this stage should have at least started sales.

After four years the start-up is anticipated to be in the mature phase. The majority (60%) agree that the start-up should be in a growth stage with profits and another 20% agree that it should have at least high growth.

A vast majority (80%) indicated they consider a start-up existing more than 8 years as successful if it is in the stage of growth with profits, while another 9% require at least profits.

It has to be mentioned that timing has a major effect on the expectations. While at the end of the 90s a start-up was expected to be acquired or perform an IPO after few years (two to four years) today the time frame is longer and investors will support a start-up for an extended period if they believe that the technology/products still have a future.

4.7 Are the participating start-ups Successful?

The following tables (7-10) show a cross-tabulation analysis between the venture stage (Part A, question 5) and the stage it should be according to the responder definition (Part C, questions a-d) according to the venture age (part A, question 2). The rows show the stage of the company and the columns show the expected stage for a company according to the respondent opinion.

Table no. 7 shows the analysis of the respondents belonging to the 8 companies that are less than two years old.

Table 7: Companies less than two years (n=8)

		The expected start-up stage				Total
		R&D funds	R&D and marketing funds	Beta site	Start of sales	
Actual start-up status	Start development	2	1	1		4
	Beta site			1		1
	start-up closed		1		2	3
Total		2	2	2	2	8

It can be observed that young start-ups have various opinions about the status the company should hold. Start-ups which are shut down after less than two years have higher expectations (probably learned from their harsh experience) and they value a young company as successful if it is able to achieve initial sales within its first two years of existence. From the 4 respondents representing companies which are in the "started development" stage, only one expects that a start-up should already be engaged in Beta site during its first two years of existence.

Table no. 8 analyzes the 16 companies that are between two and four years old.

Table 8: Companies between two and four years (n= 16)

		The expected start-up stage				Total
		Start of Sales	Sales by plan	Strategic partner	Profits	
Actual start-up status	Start development	2				2
	Start Sales	1	3	2		6
	Fast growth		1			1
	Profits				2	2
	start-up Closed	2	2			4
	Other			1		1
Total		5	6	3	2	16

Most enterprises at this stage should have sales. Analysis of all the responses also indicates the frequent preference for a strategic partner. Most of the start-ups are at the stage they expect to be (or a similar stage) besides the closed start-ups which also expected to have sales at this stage. The two start-ups that expect profits are at their expected stage.

Table no. 9 describes the 24 companies that are between four and eight years old.

Table 9: Companies between four and eight years (n= 24)

		The expected start-up stage						Total
		Sales	Sales by plan	High growth	Growth with profits	Profits	Surviving	
Actual start-up status	Start development						1	1
	Beta site		1					1
	Start sales	1	1		6			8
	Fast growth			1	3			4
	Growth with profits					1		1
	Survivability			1	2			3
	start-up closed			2	1			3
	Other		1	1		1		3
Total		1	3	5	12	2	1	24

The enterprises at this stage should have sales and are expected to show growth and/or profits. We find only two start-ups meeting their expected criteria. The results are not surprise when considering that the last four years (the recession), the name of the game was much more survivability than growth and profits.

Table no. 10 analyzes the 6 companies that are over eight years old.

Table 10: Companies operating more than eight years (n=6)

		The expected start-up stage			Total
		Sales by plan	Growth with profits	Profits	
Actual start-up status	Start sales		1		1
	Growth with profits		1	1	2
	Survivability		1		1
	start-up closed	1	1		2
Total		1	4	1	6

The enterprises at this stage are expected to show growth with profits. Only two out of six start-ups are meeting the expected criteria. Again it

probably manifests the difficult recent years in which most start-ups had to fight for survival.

4.8 The relationship between entrepreneurship previous experience in start-up companies and the company success

Tables no. 11 and 12 below analyze the stage of start-ups existing more than 2 years and 4 to 8 years, based on the experience of the responder. (Based on part A, question 2 and part B, question 5). The idea was to find if respondents (who usually are key persons in the start-up) with previous experience, assisted the start-ups to be in a more advanced position than start-ups which exist a similar period of time and their respondent did not have a previous experience.

Table 11: Companies existing over two years (n=53)

		First start-up		Total
		No	Yes	
Actual start-up status	Start development	1	2	3
	Beta site	1	1	2
	Start sales	14	5	19
	Fast growth	4	1	5
	Profits	2		2
	Growth with profits	1	2	3
	Survivability	4	2	6
	start-up closed	6	3	9
	other	3	1	4
Total		36	17	53

Table 12: Companies existing between 4 to 8 years (n=27)

		First start-up		Total
		No	Yes	
Actual start-up status	Start development		1	1
	Beta site		1	1
	Start sales	7	3	10
	Fast growth	3	1	4
	Growth with profits	1		1
	Survivability	3	2	5
	start-up closed	2	1	3
	Other	2		2
Total		18	9	27

In terms of experience there is no meaningful difference between the start-ups. The relation of about 65% of the start-ups with experienced

responders and 35% with responders who do not have former experience is maintained for most of the companies' stages. It is true for all companies existing for more than two years as well as for the group of companies existing between 4 and 8 years. The reasons can be one or more of the following:

- Experience is not so important;
- The sample is too small to receive meaningful differences;
- The responders hold different positions (It is better to compare managers in the same position, like comparing CEOs for example).

4.9 A description of the parameters of the research model

The second part of the questionnaire (Part B) presents the responders with 15 topics (see the research questionnaire in appendix no. 1). Several secondary items (parameters) were presented for each topic, as well as a summary item (the topic itself). The responders were asked to rank the various items associated with each topic on an Likert scale ranging from 1-7, according to the degree of importance the start-up affords each topic.

The mean and standard deviations of the topics and their parameters representing the answers of the responders to the diverse items are offered below. In order to construct the summary indices for each topic, based on the diverse items, tests were conducted for the internal consistency between the items and Cronbach's α coefficient was calculated for each topic (see appendix no. 3)

4.9.1 Individual statistical indices for the topics and parameters and the open questions related to each topic

Table 13: Idea importance

	N	Mean	SD
Idea formulation	79	5.87	1.390
Idea meets customer needs	78	6.27	1.136
Idea in general	79	5.89	1.240

The parameter identified as most important is that idea has to meet customers' needs. Only such an idea will bring sellable products to the market and has a chance to yield profits to the company.

Table 14: Strategy importance

	N	Mean	SD
Mission statement	79	5.30	1.555
Industry analysis	79	5.99	1.138
Strategy clarity	79	5.09	1.487
Strategy update	77	5.82	1.295
Strategy in general	78	6.00	1.140

Strategy in general is an important topic. Knowing your industry is considered as a key element and so is the strategy update. In today's dynamic high-tech world the venture has to have deep knowledge about the industry construction, key players and competitors and new technologies and trends. The market might shift very quickly and a continuous update of the strategy is needed to meet the ever changing needs and plan the adequate strategy.

Should a start-up be "Built to Last"

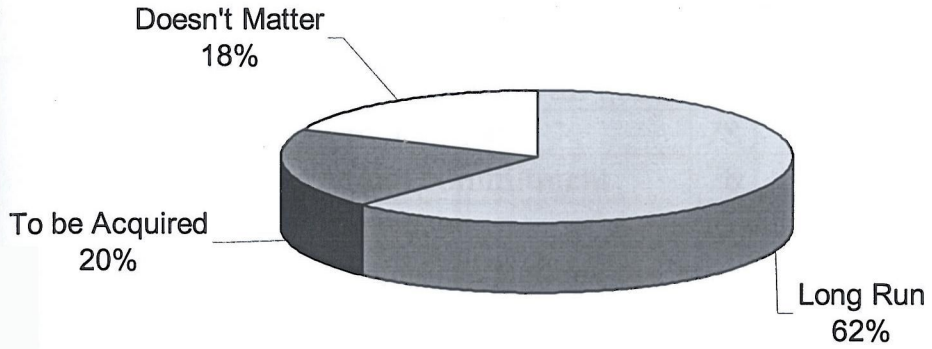


Figure 18: Distribution according to start-up long plan strategy

A very large majority believes that a start-up should be built for the long term and only 20% believe that the goal is to sell it (hopefully with a nice profit) to a big company which dominates the market. The times that Israeli start-ups that have not sold for a penny were procured by US giants for hundreds of millions or billions of US dollars like Mirabilis (the ICQ inventor) and Chromatis (an inventor of a revolutionary metropolitan optical networking systems which was procured in 2000, by Lucent from the US for US$ 4.5 billion) are over. A company has to plan its long run strategy and to thrive in the market before it can achieve an IPO or be procured for a high value.

Table 15: Core team expertise importance

	N	Mean	SD
Team diversified experience	79	5.95	1.142
Team former experience	78	5.04	1.490
Team leadership capacity	79	6.32	1.183
Consultants	79	5.24	1.478
Investors' contribution	78	4.64	1.450
Core team expertise	77	6.13	1.018

Leadership was ranked very high and appreciated to have a strong effect on the start-up success and the employee motivation. In order to achieve the goals with a small core team it is important that the team is diversified and has the knowledge and experience in all basic areas required. Investor's contribution is not seen as a major factor in success and consultants are seen as people who are not committed to the organization. Interestingly

team former experience is not seen as a major factor although the interviews discovered the importance of having former experience and preferably even start-up experience.

Table 16: Core team commitment importance

	N	Mean	SD
Core team association with goals	78	6.46	.921
Core team motivation	78	6.58	.919
Core team total commitment	78	6.47	.936

Core team commitment and its parameters are all ranked at the top. The start-up is demanding immense mental and physical efforts. Without the full association of the core team and its high motivation the efforts can not be sustained and the leading team will not be able to provide a model to all other employees.

Table 17: Organizational importance

	N	Mean	SD
Employee definition of responsibility domains	79	5.08	1.238
Few organizational levels	78	5.19	1.368
Organization in general	77	4.95	1.327

Since start-ups are small ventures they naturally tend to be managed and organized with few organizational levels and this is not considered as a main issue. Responsibility domains are also ranked with low importance since some of the prominent characteristics of the Israeli skilled employee is his multidisciplinary and high level of improvisation abilities. To take advantage of these capabilities it is better not to have a clear-cut separation of responsibility domains.

Should the Venture organization be formal?

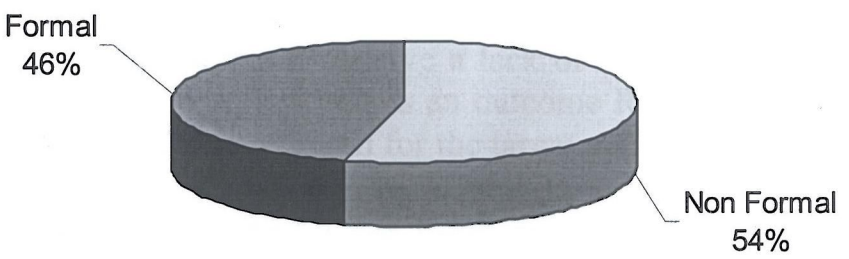


Figure 19: Distribution according to the formality of the start-up organization

The chart indicates the absence of any significant difference in preference of formal or informal start-up management. This factor depends on the nature and culture of the CEO, core team and the organizational dynamics.

Table 18: Marketing strategy importance

	N	Mean	SD
Market expertise	79	6.03	1.240
Marketing plan	78	6.01	1.051
Marketing research	79	5.08	1.457
Market growth	77	5.22	1.324
New market standards	79	4.78	1.533
International market penetration	78	5.69	1.252
Market dynamics	79	5.75	1.286
Patents registration	78	5.36	1.751
Perceived utility	79	6.34	1.120
Distribution channels	78	4.63	1.538
Product positioning	78	5.56	1.383
Marketing R&D relationship	79	5.96	1.265
Main market penetration	77	5.92	1.285
Marketing strategy	76	6.17	1.088

The parameters with high importance in marketing strategy are the perceived utility of the product, market expertise and the marketing plan. Marketing strategy is the base for all marketing activity which is a cornerstone in start-up success. The perceived utility is a major gauge to asses the real need for the product. The marketing plan is based on the strategy but has to be constructed appropriately to reflect the strategy and enable to execute it properly. As was depicted in the Strategy topic the start-up has to know the industry and needs expertise in the market. The marketing and R&D relation are also perceived as very important since even in small organization we observe a lack of coordination, sometimes driven by personality conflicts and as an outcome R&D is not developing what marketing believes is required for the target market.

Distribution channels received a low value since most of the start-ups are still not involved in massive sales. Most start-ups believe that they have to penetrate the market by themselves and once they have done it will be easy to establish the distribution channel. Often an early establishment of a professional distribution channel is not easy (the agents and distributors

don't always like to spend resources on a new product whose demand is a question mark) but can be crucial to penetrate the market. Establishing new market standards can be very rewarding but it contains a high risk and can have a destructive effect on a small start-up and therefore not seen as an important parameter for success. Education of the market to adapt new standards can be a long lasting and resource demanding process which a small start-up, with limited resources can not tolerate.

Surprisingly, market research ranked quite low. Most of the respondents claim that they didn't receive meaningful results from the research to help them in formulating the strategy or make other decisions. A possible reason could be that a professional market research in overseas markets is expensive and most start-ups prefer to save funds and are neglecting this step of market research or hire a low cost market research company which does not produce the expected results.

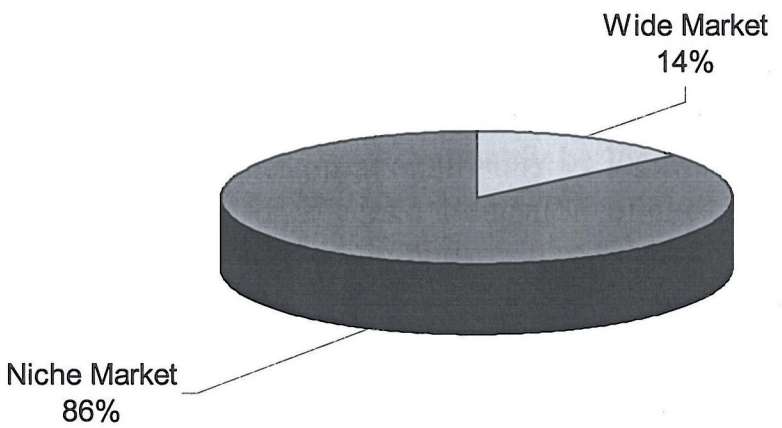


Figure 20: Distribution according to product strategy – wide or niche market?

A large majority (86%) agrees that a start-up should focus its efforts on a defined niche market.

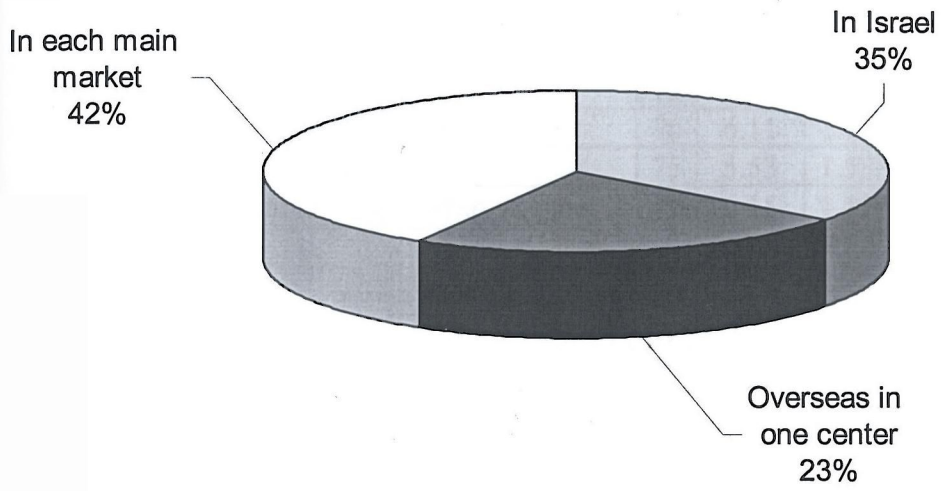


Figure 21: Distribution according to marketing team location

There is no common agreement over the location of the marketing team. If the team is big enough it should probably be located in each main market. If the start-up is still beginning its market penetration efforts it should be in Israel or in one center (within the target market)

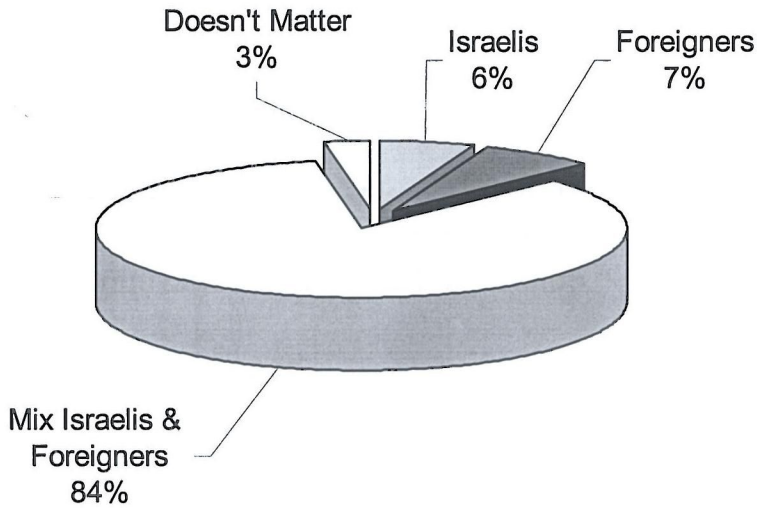


Figure 22: Distribution according to marketing team mix

A large majority (84%) agree that the marketing team should incorporate a mix of Israeli and foreigners.

Table 19: Relationships with customers

	N	Mean	SD
Customer needs	79	6.15	1.167
Customer buying behavior	79	6.16	1.126
Feedback implementing	79	6.15	1.167
Market receptivity	76	6.11	1.173
Continual sales	75	5.53	1.588
Human relationship in general	79	6.15	1.110

Most of the parameters related to the relationships with the customers are important. The customers will define the success in the market, and understanding their need and implementing their feedback is the only way to achieve a sellable product. Continual sales are not seen as critical at the stage when a start-up is mostly looking for penetration. In the long run the loyal customers which will buy the upgraded or other new products of the company are very valuable and are often a good way to attain new customers.

Table 20: Management importance

	N	Mean	SD
Management style	75	5.27	1.588
Team solidarity	79	5.99	1.204
Employee development	78	5.63	1.300
Management in general	79	6.05	1.250

The team solidarity similarly to core team association with goals is an important issue. The management style is not a critical parameter and has to be suitable to the organization culture and leadership.

Table 21: Networking importance

	N	Mean	SD
Networking in general	74	5.46	1.241

Networking is very helpful in different areas and stages of the start-up but is not viewed as critical for success.

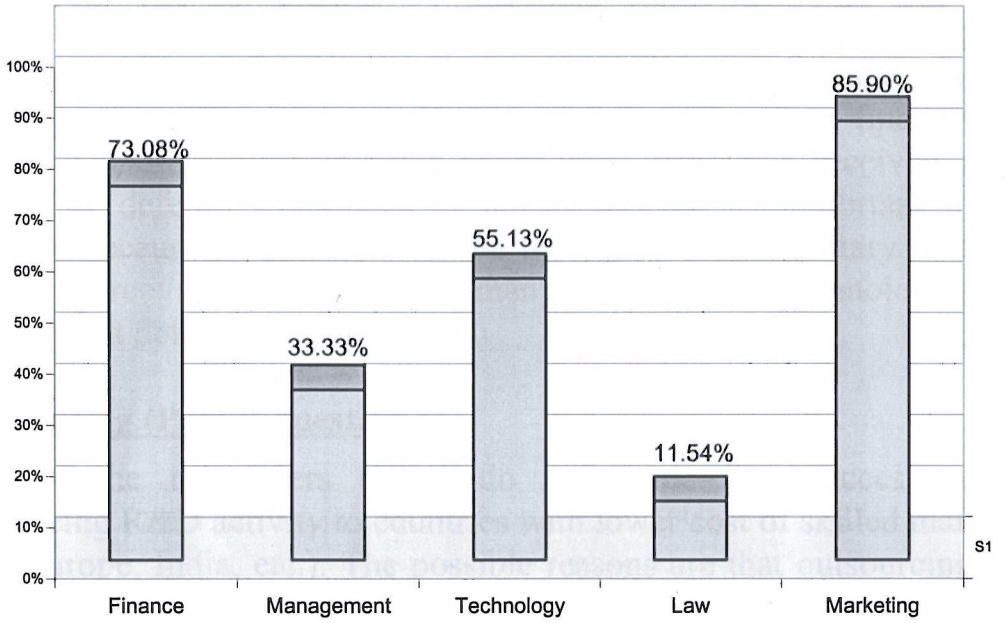


Figure 23: Distribution according to networking with other experts/consultants

The respondent consider as useful Networks with people who have good contacts in the markets and with potential investors. Also networking to gain technological knowledge and advantage was noted as valuable.

Are there any additional entities with whom it is important for the start-up to have strong networking? (Question 1.2 in Part B)

- Specialists in the industry and influential consultants (including from academia)
- Leading customers as potential strategic partners

Table 22: R&D importance

	N	Mean	SD
Technological manpower availability	72	5.78	1.141
Defense technology and infrastructure	71	4.23	1.806
Development team	78	5.95	1.161
Innovation level	77	5.70	1.358
Technological breakthrough	77	5.34	1.353
Easiness of adaptation	76	5.55	1.341
Product quality and durability	77	6.12	1.256
Product price	77	5.71	1.346
Time to market	75	5.41	1.480
R&D capability in general	75	5.95	1.038

The important parameters related to R&D are the team capability in general and the quality and durability of the product. A poor product receives a bad word of mouth which disseminates quickly and customers will disappear. During the prosperity it was difficult to find adequate skilled technological manpower hence this parameter received a high score. The defense technology is not considered as important but that might be because most people ignore the effect of the military service on the workforce and the fact that many of the core technologies were developed at defense organizations.

Outsourcing (Part B question 5)

Most of the responders (70%) do not agree that success requires outsourcing R&D activity to countries with lower cost of skilled manpower (East Europe, India, etc.). The possible reasons are that outsourcing R&D requires management and control which are not worthwhile if the R&D effort involves only a small team. In-house R&D protects also the unique technology on which many start-ups base their strategic advantage.

Table 23: Complete product importance

	N	Mean	SD
A gadget	69	4.64	1.455
Complete product	72	5.39	1.561
Cooperation in R&D	70	5.31	1.528
Cooperation in marketing	69	5.71	1.426
Complete solution in general	72	5.36	1.485

Since the notion of "Complete Product" could not be explained in the questionnaire in details, this point might have been misunderstood by many of respondents. Most of the respondents feel that a complete solution is not important and also cooperation with other entities for marketing or R&D purposes is not seen crucial.

Table 24: Importance of funding type

	N	Mean	SD
Fund type importance	74	5.31	1.303

Since investors are not considered as having a major impact on the start-up funding type is not an issue. The main fund suppliers are the VCs and from this perspective their existence is very important.

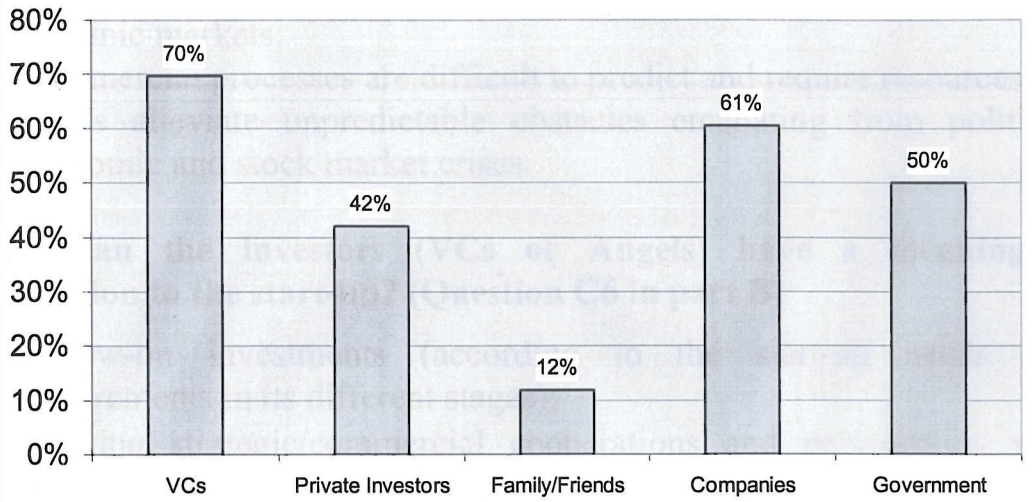


Figure 24: Distribution according to the importance of funding organizations

VC organizations (70%), other existing companies (61%) and government funds (50%) were identified as the main funding resources.

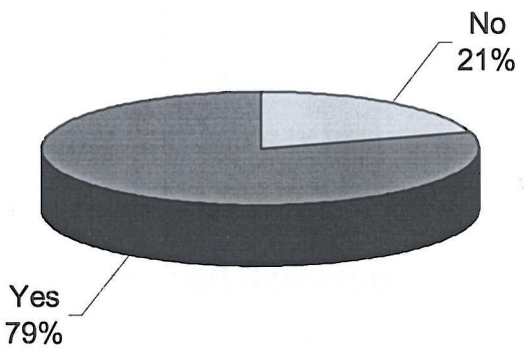


Figure 25: Distribution according to fund raised to "cross the chasm"

A majority agree that it is important to raise funds in order to be able to penetrate the main market (the majority of the customers) but in reality most start-ups are still occupied how to penetrate the initial market.

Some argue that financing of a start-up has to be raised when possible and available and not when needed. Please offer your opinion on this? (Question L.3 in Part B).

More than 80% agree that a start-up should raise funds when possible and available. Some comments regarding funds are:

- Raise more than you expect you need;

- Sufficient funds enable changing course, quite essential in today's dynamic markets;
- Commercial processes are difficult to predict and require resources;
- Funds alleviate unpredictable obstacles emanating from political, economic and stock market crises.

Where can the investors (VCs or Angels) have a meaningful contribution to the start-up? (Question C6 in part B)

- Follow-on investments (according to the start-up needs and requirements in its different stages);
- Creating strategic/commercial cooperations and partnerships with investors, industry and customers and serving as door openers;
- Providing strategic direction and business advice;
- Recruitment of key personnel and creation of leadership

Table 25: The importance of politics

	N	Mean	SD
Political environment	76	4.39	1.658
Security situation	76	4.26	1.708
Political situation in general	77	4.34	1.553

According to the respondents the political situation, environment and security problems in Israel have a low effect on a start-up success.

Table 26: General environmental importance

	N	Mean	SD
Military service	71	4.45	1.730
Entrepreneurship education	78	4.85	1.387
Availability of skilled workforce	75	5.64	1.259
Government support	75	4.89	1.420
Cultural and social norms	77	5.18	1.325
Environment in general	77	4.96	1.219

Similarly to Politics also the General Environment has little effect on success. The parameter that concerns the respondents is the availability of skilled workforce (similar to the former parameter "Technological manpower availability").

Table 27: The economic situation

	N	Mean	SD
Global economy	78	5.63	1.340
Domestic economy	76	4.79	1.586
Availability of financial resources	78	5.82	1.246
Economy in general	77	5.43	1.271

Economy in general does not have a strong effect on the success and only the indirect influence on the availability of funds is relatively essential.

4.10 Ranking of the topics

The ranking of the topics was performed in three different ways. The first ranking was in part B and was presented in the former paragraph. Two other ranking methods were performed in Part C. The respondents were asked first to rank the topics into three groups of importance and then to rank within each group which enabled to rank the topics from 1 (the most important topic in group 1) to 15 (the least important topic in group 3). Some respondents ranked only groups and not within groups. In order to compare all methods of ranking the author calculated the average ranking of each topic and its parameters in Part B. This is the fourth ranking method which is dubbed Part B average ranking.

4.10.1 Ranking of the average score in Part B

The average score of each topic in Part B was performed by calculating for each topic the average results of all the parameters. Table 28 shows the outcome of this ranking method. Figure 26 presents the same ranking in a graph.

Table 28: Central and distribution indices and the ranking of the topics (average ranking in part B)

	N	Min.	Max.	Mean	SD	Ranking
Core team commitment	79	1.00	7.00	6.50	.87	1
Customer relation	79	1.40	7.00	6.04	1.02	2
Idea	79	1.00	7.00	6.01	.94	3
Management	79	1.00	7.00	5.74	1.11	4
Core team expertise	79	1.20	7.00	5.66	.91	5
Strategy	79	2.20	7.00	5.64	.96	6
Marketing strategy	79	2.92	6.86	5.60	.86	7
R&D	78	2.10	6.80	5.59	.79	8
Networking	74	1.00	7.00	5.46	1.24	9
Economy	78	1.00	7.00	5.42	1.18	10
Funding type	74	1.00	7.00	5.31	1.30	11
Complete product	72	1.00	7.00	5.29	1.24	12
Organization	79	1.00	7.00	5.08	1.05	13
General environment	78	2.33	7.00	4.99	.95	14
Politics	77	1.00	7.00	4.34	1.58	15

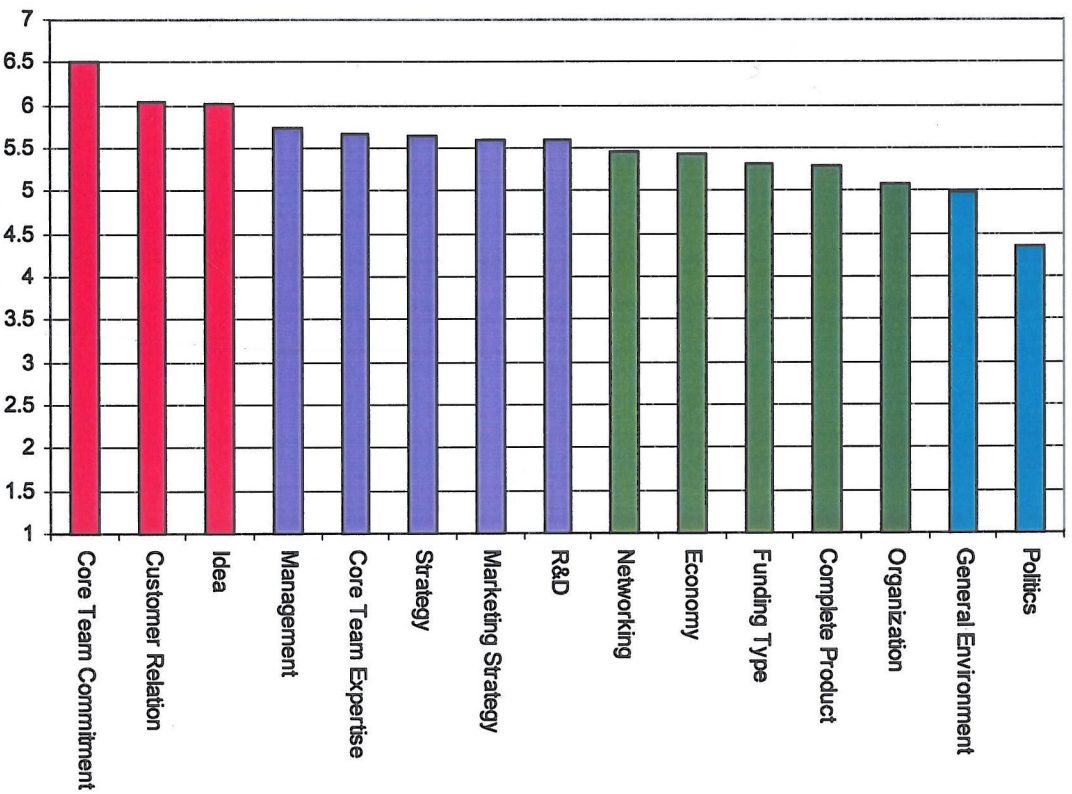


Figure 26: Ranking for the average of 15 items from part B of the questionnaire, arranged according to the rank

The subject which is ranked highest is the core team commitment and the subject that is conceived with the lowest important (much below the others) is the political situation.

In order to have a better feeling for the ranking of the topics a comparison of the mean score and ranking of the topic between the average of all parameters of a topic and the summary item (the topic itself) in part B was established. Table 29 presents this comparison outcome. The main difference in the two ranking methods is in two topics: Idea (ranked lower in the summary item), Marketing Strategy (ranked higher in the summary item). This shows that the ranking is not a clear cut solution but can provide strong indication for the more important and less important topics and parameters.

Table 29: Comparing of mean score and ranking of the topics between average and summary item (in part B)

	Mean Score (average in Part B)	Ranking of average in part B	Mean score of the summary item (part B)	Ranking of summary item (part B)
Core team commitment	6.50	1	6.47	1
Customer relation	6.04	2	6.15	3
Idea	6.01	3	5.89	8
Management	5.74	4	6.05	5
Core team expertise	5.66	5	6.13	4
Strategy	5.64	6	6.00	6
Marketing strategy	5.60	7	6.17	2
R&D	5.59	8	5.95	7
Networking	5.46	9	5.46	9
Economy	5.42	10	5.43	10
Funding type	5.31	11	5.31	12
Complete product	5.29	12	5.36	11
Organization	5.08	13	4.95	14
General environment	4.99	14	4.96	13
Politics	4.34	15	4.34	15

4.10.2 Separate Ranking of the topics (Part C)

In part C of the questionnaire (see appendix no. 1) the responders were asked to rank the 15 topics. In contrast to part B, in which each item is ranked on a 7-rank scale, in part C the respondents are asked to locate the topics according to their order of importance compared to the others. In this way the responders were asked to concentrate their efforts in indicating the relevant importance of each subject in reference to the other subjects. First the topics were organized into three groups: group 1 – very important, group 2 – moderate importance, group 3 – little importance. This enables coarse differentiation between the importance levels of the different topics, which is sometimes difficult when one has to rank 15 subjects. The topics were thereafter ranked within each group according to the order of their importance (1- most important and so on). The author then ranked the various items on a scale of 1-15 according to their primary ranking (into three groups) and the ranking within each group. Some respondents only divided the topics into the three main groups and did not rank them within each group. Table 30 and figure 27 exhibits the outcome of the topics' rankings in Part C.

Table 30: The central and distribution indices of the responders' ranking for the 15 items in part C on a scale of 1-15

	Valid	Missing	Mean	Median	Mode	SD	Min.	Max.	Rank
Idea	41	38	3.39	2	1	3.04	1	11	**1**
Strategy	41	38	3.95	3	2	2.98	1	13	**2**
Core team expertise	41	38	4.32	4	3	2.53	1	11	**3**
Marketing strategy	41	38	4.68	5	5	2.37	1	10	**4**
Core team commitment	41	38	5.02	5	6	2.46	1	10	**5**
Management	41	38	5.59	5	3	3.23	1	14	**6**
Customer relation	41	38	6.61	6	5	2.57	1	12	**7**
R&D	40	39	7.05	8	8	2.68	3	12	**8**
Networking	40	39	9.70	10	10	2.70	3	14	**9**
Funding type	40	39	10.28	11	11	3.10	2	15	**10**
Organization	41	38	10.44	11	13	2.75	5	15	**11**
Complete product	40	39	10.75	11.5	12	2.84	5	15	**12**
Economy	40	39	11.33	12.5	14	3.53	1	15	**13**
General environment	40	39	12.83	13.5	14	2.27	5	15	**14**
Politics	40	39	13.88	14	15	1.36	10	15	**15**

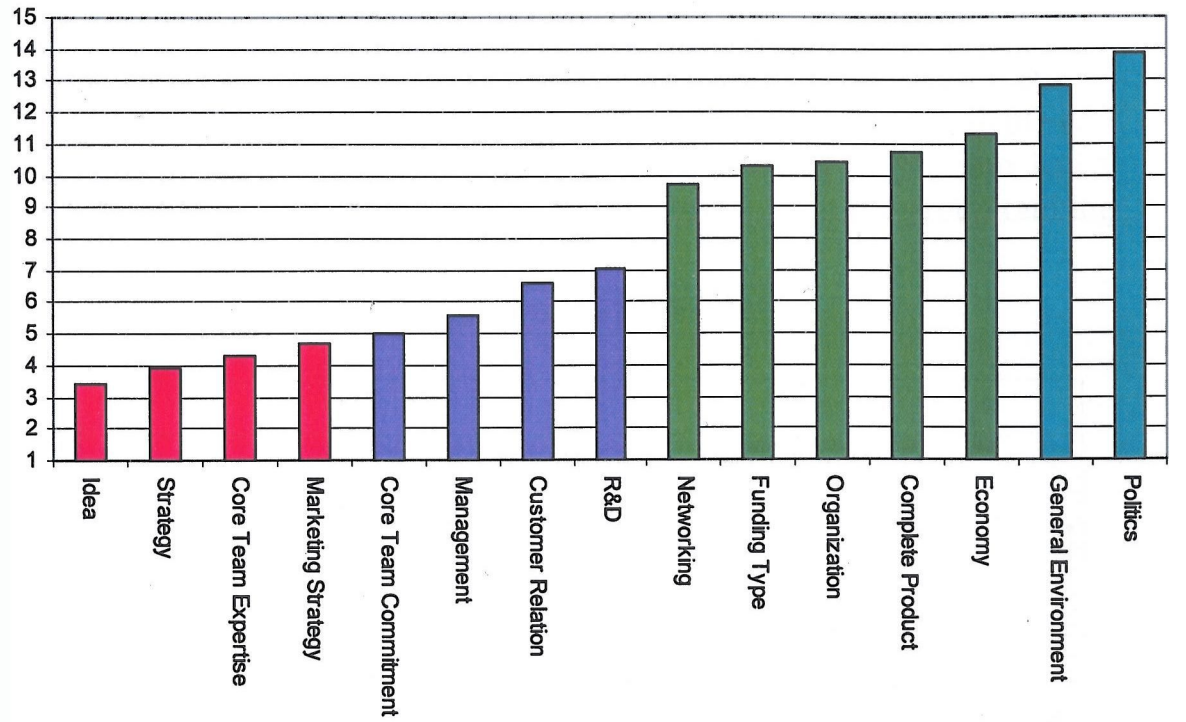


Figure 27: Ranking of the topics according to their average score in part C

The issue scored highest in the ranking of Part C is - Idea, followed by Strategy, Core Team Expertise, Marketing Strategy and Core Team Commitment. The issues of General Environment and the Politics are ranked lowest.

Figure 28 shows the distribution of the topics' ranking into three groups (in part C). The topics are placed in order of their ranking. Core team expertise ranked at the top and Politics ranked at the bottom. As expected the two different rankings in Part C are quite similar. The only topic that had a difference of 3 places in ranking was R&D (ranked 5th in the group ranking and 8th in the scale tanking).

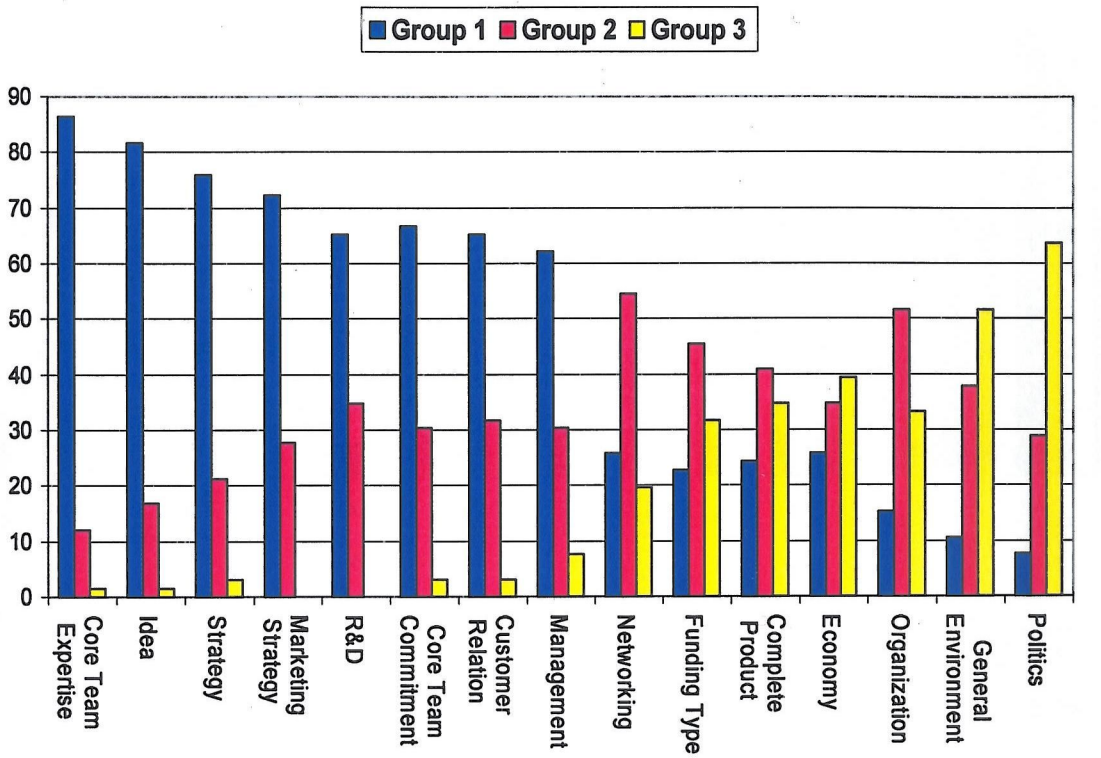


Figure 28: Distribution of the locations of each topic in the three groups from part C of the questionnaire

Next is a chart comparing all the ranking methods (in part B and part C) accompanied by an analysis of the results.

4.10.3 Summary of the topics' ranking

Figure 29 compares the rankings in all four methods.

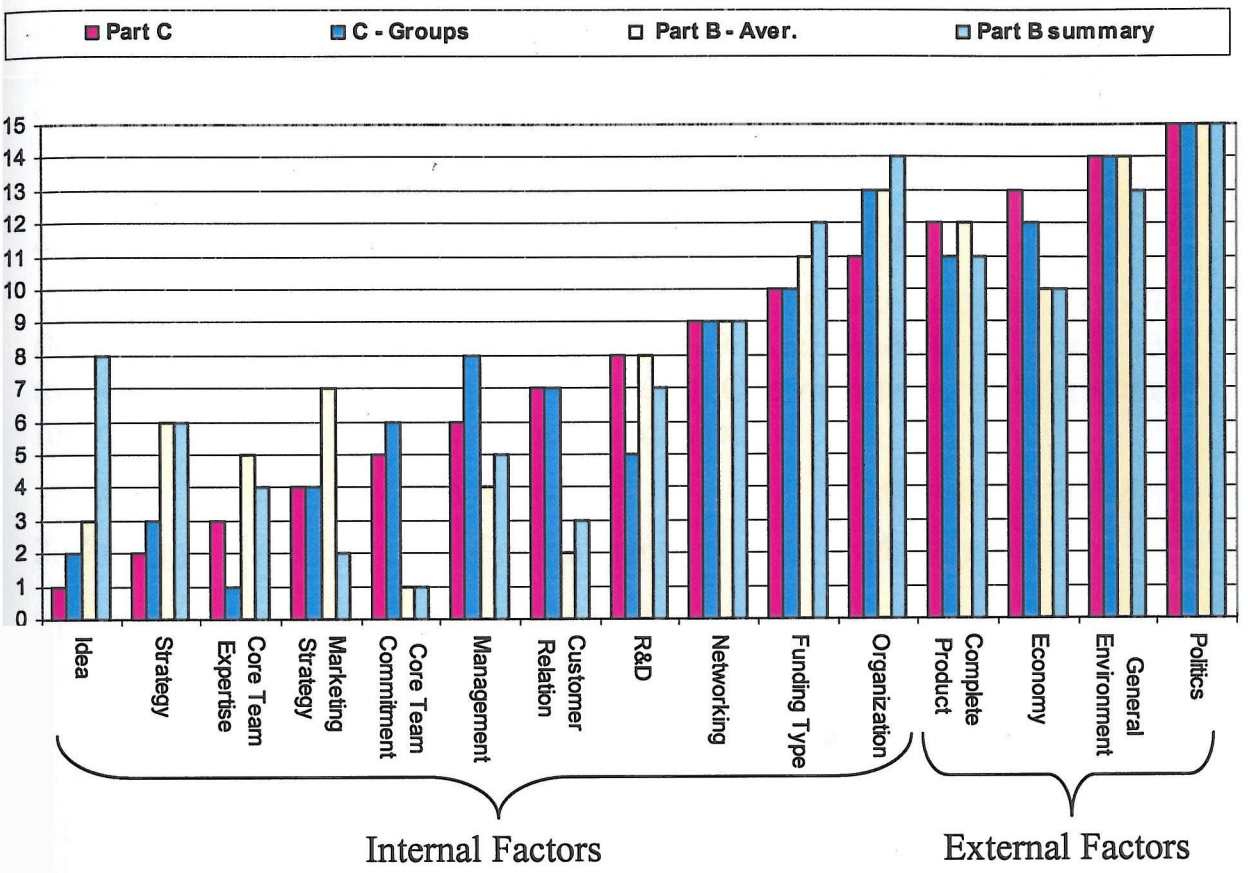


Figure 29: Comparison of the locations for each of the 15 domains between part B and part C of the questionnaire

Figure 29 indicates that the ranking in all different methods was identical or very similar with respect to four topics: Networking, offering a Complete Product/Solution, Politics and the General Environment. Small differences in most rankings were found with respect to seven topics: The Idea (besides summary of part B), the Expertise of the Core Team (besides C groups ranking, which is somewhat higher), the Organization, the company Management (C-Groups ranking somewhat lower), R&D capability (C-Groups ranking somewhat higher), the Funding Type, and the Economy (Part B ranking higher than part C ranking).

Somewhat bigger gaps between Part B and Part C rankings are in: Strategy (Part C higher ranking), Customer Relations and Core Team Commitment (Part B higher ranking). In Marketing Strategy there is a big variation in part B while Part C is providing a high rank (4th place) similar to the average of the two rankings in Part B.

All the external factors had a low ranking while General Environment and Politics are consistently ranked at the last two places.

The study considers the ranking in Part C, in which respondents had to concentrate on the topics and the relation between each to the other, to be the best representation of the real thoughts and beliefs of the respondents and as we can observe the results are very similar to the average of all ranking methods.

4.10.4 The analysis for ranking part C on a scale of 1-15

There is a notable gap in the ranking scores between positions 6 to 7 (Management and Customer relations), 8 to 9 (R&D and Networking), 13 to 14 (Economy and General environment). One may thus claim that the following factors are of the utmost importance:

1. Idea
2. Strategy
3. Core Team Expertise
4. Core Team Commitment
5. Marketing Strategy
6. Management

The following factors seem to be of moderate importance, when ranked on a scale of 1-15:

7. Customer relations
8. R&D

At the same time, customer relations appear in second and third place when ranked in Part B, so that despite the disparity, it is certainly an important issue.

Although R&D importance appears in 7th and 8th place in the three separate rankings (but 5th in Part C group ranking), it appears distinctly in the first group of the division according to groups. Without R&D of a high level there will be no products, which is the essence of the venture. This is also one of the strengths of Israeli start-up companies and thus there is no need for special attention to the obvious. The attitude reflected in the ranking of the R&D subject is most probably beyond the basic, essential development which must be of a high level.

The following factors were found to be of the lowest importance in all instances and were ranked between 9th - 15th places:

9. Networking
10. Funding Type
11. Organization
12. Complete product
13. Economy
14. General environment
15. Politics

Also in the group ranking there is a big gap between the first eight topics and the following 7 (starting with Networking). The last two topics, general environment and politics, are clearly ranked in the last two places and can be considered as having a low effect on the start-up success.

If we would average of all the ranking methods there would be some minor changes in the ranking. The ranking would be as following:

1. Core Team Commitment	6. Customer Relations	11. Economy
2. Core Team Expertise	7. Management	12. Complete product
3. Idea	8. R&D Capability	13. Organization
4. Strategy	9. Networking	14. General environment
5. Marketing Strategy	10. Funding type	15. Politics

There are no significant changes and most topics are not moving more than one position. The main changes are: Core Team Commitment would move to the first two places (the only significant change) and idea moves down to the third place. Strategy moves down to 4th place. Economy replaces its position with Organization.

4.10.5 The ranking results including the validation process

The validation of the model was done at the final stage of the research. After analyzing the results of the respondents and establishing the final model some respondents were asked to re-rank the topics. From the 36 respondents asked for validation feedback the author received 16 valid answers, a response rate of 45%. A comparison between the respondents' results of the re-ranking of the model in the validity process and the model itself was performed in order to establish validity.

The results of the validation process are depicted in figure 30.
The shadowed box shows the answers of the 2nd and 3rd quartiles and the bold line in each box represents the median of the results. The star and circle symbols reflect outliers in the results. Marketing and Management are ranked very closely with the same median and only a small difference in the average, due to the lower ranking of the 4th quartile of management.

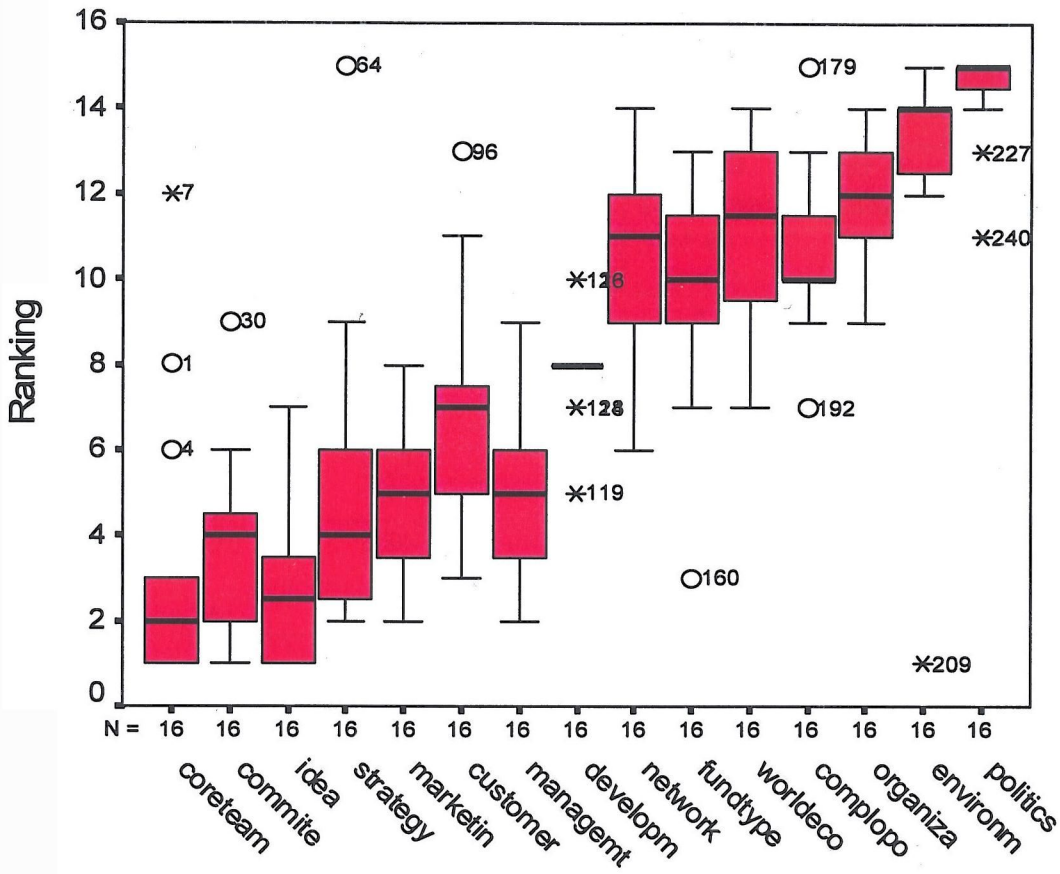


Figure 30: Ranking of the validation process respondents

The ranking of the topics according to this analysis is:

1. Core Team Expertise	6. Management	11. Networking
2. Idea	7. Customer Relationship	12. Economy
3. Core Team Commitment	8. R&D	13. Organization
4. Strategy	9. Funding Type	14. General Environment
5. Marketing	10. Complete Product	15. Politics

Appendix 10 shows the results in tables.

A summary of the topics' ranking in all the methods, based on ranking in Part B, Part C and the validation ranking is presented in table 31.

Table 31: A summary of topics' ranking in all the methods including the validation ranking

Topic	Part C (1 – 15)	Group Mean Score part C (range 1-3)	Groups in part C (1-3)	Part B (average of all items)	Par B (Summary Item)	Model Validation
Idea	1	1.20	2	3	8	2
Strategy	2	1.27	3	6	6	4
Core team expertise	3	1.15	1	5	4	1
Marketing strategy	4	1.28	4	7	2	5
Core team commitment	5	1.36	6	1	1	3
Management	6	1.45	8	4	5	6
Customer relation	7	1.38	7	2	3	7
R&D	8	1.35	5	8	7	8
Networking	9	1.94	9	9	9	11
Funding type	10	2.09	10	11	12	9
Organization	11	2.18	13	13	14	13
Complete product	12	2.11	11	12	11	10
Economy	13	2.14	12	10	10	12
General environment	14	2.41	14	14	13	14
Politics	15	2.56	15	15	15	15

The validation process evidently validates the developed research model. The biggest difference between the ranking in Part C and the ranking in the model validation process is no more than two positions. The two groups recognized in the model of the more important topics and the less important topics are clearly manifested. The validation process illustrates a big gap between the first 7 topics and the last 7 topics while R&D staying in the center as a buffer between those two groups.

4.11 Weaknesses, reasons for failures and possible improvement of Israeli start-ups

Three further closely connected issues (asked in open questions) may now be analyzed. The questions relate to the weaknesses of Israeli start-ups, the main reasons for failures and respondents advice how to improve the start-ups performance. The questions are 2, 3 and 4 in part C and the detailed analysis appears in appendix 4.

4.11.1 Successful start-up companies also have some weaknesses. What do the start-ups need in order to improve their performance?

The main issues often mentioned by the respondents are:

1 Lack of skilled professional management
(Very often poor balance between marketing and R&D Management, with too much focus on technology);
2 Marketing strategy drawbacks:
- Lack of understanding the market;
- Late marketing activity;
- Selection of a too small market niche;
- Lack of planning market expansion into new markets/products;
- No continuous update of marketing plans and strategy, according to market events;
- Weaknesses in the marketing setup;
- Late and/or bad construction of the marketing department;
- Insufficient investments in sales and distribution channels.

Points mentioned several times in the responses:
1 Lack of basic requirements in the Core team. The core team has to be experienced, professional and committed;
2 Strategic myopia (or not crystallized strategy) and lack of strategy update;
3 Poor adaptation of the product to the real market needs (focus on the product instead of needs and developing of a too smart product not meeting the marketing requirements);
4 Poor product quality and lack of a full product (packaging, integrated logistic support);
5 Insufficient funds (poor assessments of needs, costs, funding for crisis periods).

Points raised by few respondents were:
1 Lack of experience and versatility in the workforce;
2 Poor organizational culture and personal relationship;

3 Not enough focus in marketing;
4 Bad selection of Investors (they intervene and interfere).

4.11.2 What are the main reasons for the failure of Israeli start-ups?

The main issues mentioned often by the respondents are similar to the issues in the former question. In addition they mentioned:

- Adaptation of the product to the real market needs (focus on the product instead of needs and developing of a too smart product not meeting the marketing requirements).

Other points mentioned several times:
1 Developed, experienced, professional core team;
2 Listening and understanding customer's needs for product definition and implementation of customer's feedback;
3 Insufficient funds (as point 5 in previous question).

Points raised by few respondents were:
1 Strategic myopia (as in the question before);
2 Distance from the market and cultural differences;
3 Deficient R&D, resulting in long development and lack of preciseness in small details;
4 Lack of a good technology.

4.11.3 Please offer three pieces of advice which you would give from your own experience to Israeli start-up managers

The issues mentioned often by the respondents were:
1 Foster a professional, experienced harmonized and committed core team with good interpersonal relations;
2 Create a sound marketing strategy based on thorough investigation and knowledge of the market;
3 It is essential to have sufficient and on time funding.

Other points sometimes mentioned:
1 Strive for cooperation with customers and/or leading companies at an early as possible stage (but select them carefully);
2 A courageous decision making system including a continuous scrutiny of the business plan, the results and the implementation of change according to needs (including drastic changes like changes in the top management;
3 Consult and listen to gain knowledge and experience, (don't be afraid to participate others and to tell your story) and select high level consultants.

Points raised by few respondents were:

1 Management experience (focus on management and marketing and not on technology);
2 Be modest (reduce the ego, arrogance and greediness);
3 Perseverance (do not despair, leadership and belief in the organization);
4 Have a confined, well-defined and focused market niche;
5 Focus, focus, focus (on markets and products);
6 Find investor(s) as strategic partner which can provide added value.

4.11.4 General remarks

The responses to some questions emphasize that it is sometimes difficult to give a clear answer. Examples of this are: Developing a product for a focused (niche) market or a wide market depends on the strategy. Is it for an OEM product or a stand alone complete solution? Once a start-up selects a complete solution strategy it has to be focused and well targeted to avoid a quick exploitation of resources. But even start-up companies targeting OEMs have to be focused on a narrow family of products to achieve results in a limited time span.

The location of the marketing team depends on the product, market and marketing strategy. The involvement of foreign marketers who know and understand the customer culture and the market is almost always highly important.

The issue of "Complete Product" was probably not fully understood by all the respondents. Since some gave a high score to a product which is a device well as to a complete solution.

4.12 Inference statistical analysis

The paired sample t-test was conducted in order to identify if there are meaningful differences in ranking of a specific topic and the following topic. The results are shown below.

Table 32: paired sample t-test between each topic and the following topic according to the ranking in part C of the questionnaire

	Mean difference	SD of the difference	t	df	Sig.
Idea vs. strategy	-.56	3.775	-.95	40	.347
Strategy vs. core team expertise	-.37	4.194	-.56	40	.580
Core team expertise vs. marketing strategy	-.37	4.017	-.58	40	.563
Marketing strategy vs. core team commitment	.34	3.759	.58	40	.564
Core team commitment vs. management	-.56	4.284	-.84	40	.407
Management vs. customer relations	1.02	4.180	1.57	40	.124
Customer relations vs. R&D	-.47	4.132	-.73	39	.472
R&D vs. networking	2.65	3.984	4.21**	39	.000
Networking vs. funding type	-.58	4.396	-.83	39	.413
Funding type vs. organization	.25	4.573	.35	39	.731
Organization vs. complete product	-.22	4.029	-.35	39	.726
Complete product vs. economy	-.57	4.898	-.74	39	.462
Economy vs. general environment	1.50	3.803	2.49*	39	.017
General environment vs. politics	1.05	2.353	2.82**	39	.007

(**) $p<0.01$; (*) $p<0.05$

The data above reveals significant differences in ranking between:

- R&D and Networking;
- Economy and General Environment;
- General Environment and Politics.

With lower significance we observe a difference between Management and Customer Relations

The most significant gap between R&D and Networking was also manifested in the big difference in scores these topics have received and the group ranking (in part C) of these topics (R&D mostly in group I while Networking mostly in group II and III). Therefore we can say that R&D definitely belongs to the more important topics while Networking is part of the second group with lower importance.

In order to test if there is a relationship between the ranking in part B (according to the summarizing variable of each topic) and the ranking in part C (1-15 range) a Pearson correlation coefficient between the ranking of all topics in the two parts (B and C) was calculated.

Table 33: Pearson correlation coefficient between the ranking of Part B (the summarizing variable of each topic) and part C (rank 1-15) for all the topics

		Pearson Correlation	Sig. (2-tailed)
1	Idea	.423**	.006
2	Strategy	.361*	.022
3	Core team expertise	.223	.166
4	Core team commitment	.412**	.008
5	Organization	.299	.064
6	Marketing strategy	.236	.138
7	Customer relations	.070	.664
8	Management	.361*	.020
9	Networking	.236	.153
10	R&D	.239	.142
11	Complete product	.350*	.031
12	Funding type	.455**	.004
13	Politics	.483**	.002
14	General environment	.172	.289
15	Economy	.350*	.027

(**) $p<0.01$; (*) $p<0.05$

There are significant positive correlations between the ranking in part B and part C in eight of the fifteen topics as following: Idea, Strategy, Core Team Commitment, Management, Complete Product, Funding Type, Politics and Economy. The correlation is significant for most topics which are at the top or bottom of the list.

Idea, Strategy and Core Team Commitment were highly ranked in Part C. Funding Type, Complete Product, Economy and Politics are low in their ranking. From the subjects ranked low only General Environment does not show high significance. Many of the topics ranked in the middle, such as Customer Relationships, Organization, Marketing Strategy, Networking and R&D do not have a significant correlation.

Some tests were conducted to realize if there are any differences in ranking between young, successful and surviving/closed companies. The following table shows one of the tests comparing the ranking of each topic in Part B. The tests in general identified only few significant differences.

Table 34: A one-way ANOVA variance test, comparing the ranking of the topic in part B (1-7) between young, successful and surviving/closed start-ups

	Young (n=13)		Successful (n=30)		Surviving or closed (n=19)		F(2,59)	Sig.
	Mean	SD	Mean	SD	Mean	SD		
Idea	5.77	1.833	6.17	.913	5.53	1.172	1.653	.200
Strategy	5.62	1.805	6.13	.730	5.94	.998	.992	.377
Core Team Expertise	5.77	1.589	6.07	.704	6.16	1.119	.538	.587
Core Team Commitment	6.23	1.641	6.55	.506	6.32	1.057	.569	.569
Organization	4.69	1.494	5.36	1.254	4.74	1.327	1.724	.188
Marketing Strategy	6.25	.866	6.41	.733	5.78	1.734	1.714	.189
Customer Relation	5.69	13	6.40	.724	5.89	1.370	2.094	.132
Management	6.23	1.641	6.27	.868	5.42	1.610	2.691	.076
Networking	5.23	1.641	5.65	1.093	5.33	.970	.673	.515
R&D	6.00	1.581	6.22	.698	5.44	1.042	2.976	.059
Complete Product	5.15	1.951	5.81	1.039	4.82	1.776	2.396	.101
Funding Type	4.77	1.536	5.42	1.447	5.11	1.132	1.005	.373
Politics	4.46	1.506	4.61	1.343	3.42	1.677	3.842*	.027
General Environment	4.85	1.573	5.29	1.084	4.47	1.124	2.571	.085
Economy	5.23	1.691	5.54	1.290	5.16	.898	.563	.573

(*) $p<0.05$

In this comparison only politics has a significant difference. Other three topics: Management, R&D and General environment have demonstrated differences at the significance level of $0.05<p<0.10$. It indicates again that politics is a factor which might have a stronger effect than the start-up community realizes. Since the high-tech products of the start-ups are often sold to organizations, politics can be at different levels of the customer's organization as well as being affected by national politics. Possibly the start-ups, and primarily the unsuccessful ones, lack the deep understanding and appreciation of political influence in the international business world.

The ranking of successful companies is higher than of survivors/closed companies in all the topics besides core team expertise.

There are two main possible reasons for the lack of significant differences:

- The main reason is that respondents answered according to their experience and not according to the reality at their start-ups;
- The sample is too small to have a significant difference between the groups.

Table 35: A Summary of variance tests of replies to question 8, "Is the technology origin in the defense industry"

	Mode of ranking								
	Summarizing Parameter (part B)			According to parameters average (part B)			Ranking in part C (1-15)		
	df	F	Sig.	df	F	Sig.	df	F	Sig.
Idea	2,65	.853	.431	2,65	1.208	.305	2,32	1.565	.225
Strategy	2,64	.783	.461	2,65	.073	.929	2,32	2.332	.113
Core team expertise	2,64	.116	.890	2,65	.007	.993	2,32	.336	.717
Core team commitment	2,64	1.083	.345	2,65	1.067	.350	2,32	2.113	.137
Organization	2,63	2.293	.109	2,65	1.419	.249	2,32	.293	.748
Marketing strategy	2,62	.408	.667	2,65	.121	.887	2,32	.918	.409
Customer relations	2,65	.603	.550	2,65	.143	.867	2,32	.629	.540
Management	2,65	.520	.597	2,65	.115	.891	2,32	.130	.878
Networking	2,60	.230	.795	2,65	.230	.795	2,32	.422	.659
R&D	2,61	1.120	.333	2,65	.719	.491	2,32	1.284	.291
Complete product	2,58	.232	.794	2,65	.200	.819	2,32	1.390	.264
Funding type	2,60	1.223	.301	2,65	1.223	.301	2,32	1.586	.221
Politics	2,63	.040	.961	2,65	.008	.992	2,32	2.066	.144
General environment	2,63	.702	.500	2,65	.125	.883	2,32	1.742	.192
Economy	2,63	.511	.602	2,65	.342	.712	2,32	2.077	.142

As was expected there are no significant differences in the ranking between companies based on technology stemming from the defense industry and other companies. All the topics have a similar effect on a high-tech start-up success regardless to the origin of the technology.

Experts in high-tech start-ups might look differently at some issues. To find out if there is any difference a comparison between two groups was performed; the group of those who are involved in start-up activity as investors or consultants, and the group of those who are part of start-ups.

Table 36: t-test for independent samples for all topics according to type of respondent (expert or start-up company), in the three different modes of ranking

	Mode of ranking								
	Summarizing parameter (part B)			According to parameters average (part B)			Ranking in part C (1-15)		
	t	df	Sig.	t	df	Sig.	t	df	Sig.
Idea	-.309	77	.758	-.934	77	.353	.920	39	.363
Strategy	.295	76	.768	-.884	77	.379	.993	39	.327
Core team expertise	-1.342	75	.184	-1.911	77	.060	-.017	39	.987
Core team commitment	-1.181	76	.241	-1.037	77	.303	.203	39	.840
Organization	.376	75	.708	-.277	77	.783	-.697	39	.490
Marketing strategy	-.090	74	.929	-1.615	77	.110	-.723	39	.474
Customer relations	-1.062	77	.292	-1.494	77	.139	-1.273	39	.211
Management	-.945	77	.347	-.794	77	.430	-.066	39	.948
Networking	-1.494	72	.140	-1.494	72	.140	-.292	38	.772
R&D	-.827	73	.411	-2.364*	76	.021	-1.111	38	.274
Complete product	-.545	70	.587	-.564	70	.574	-1.173	38	.248
Funding type	-1.828	72	.072	-1.828	72	.072	.947	38	.350
Politics	-.352	75	.726	-.634	75	.528	.727	38	.472
General environment	-.384	75	.702	-.321	76	.749	.963	38	.342
Economy	-.455	75	.651	-.446	76	.657	.366	38	.716

(*) $P<0.05$

A significant difference was discovered only in R&D with respect to ranking according to the average parameters of part B. A difference (with significance of $0.05<p<0.10$) was found in two other topics (of part B): Core Team Expertise and Funding Type. In all these subjects "experts" ranked the topics higher. In regard to Part C ranking, there were no significant differences in any topic. One would expect that the "experts" consider the investors related to Funding Type as an important issue while most of the start-ups don't feel that way and ranked the Funding Type topic relatively low in its importance. Experts have a wider perspective analyzing many start-ups hence view Core Team Expertise as highly important but also the start-ups themselves ranked this topic very high and even as the most important topic in part B. R&D is very important for experts and as explained before seems to be a fundamental issue for the start-up community and hence was not ranked at the top.

Table 37: Pearson correlation coefficient between the capital raised by the company (question 9 part A) and the research ranking modes

	Amount of raised funds ($ millions)		
	Summarizing parameter (part B) n=65	According to parameters average (part B) n=65	Ranking in part C (1-15) n=34
Idea	.134	.160	.131
Strategy	.114	.200	-.065
Core team expertise	.264*	.239	-.356*
Core team commitment	.153	.157	.003
Organization	.326**	.201	.174
Marketing strategy	.168	.262*	-.012
Customer relations	.311*	.224	-.038
Management	.129	.134	.011
Networking	.116	.116	.240
R&D	.246	.132	-.073
Complete product	.036	-.057	-.041
Funding type	.196	.196	-.008
Politics	.147	.138	-.147
General environment	.096	.108	.017
Economy	.239	.269*	.066

(**) $p<0.01$; (*) $P<0.05$

The table above compares the ranking of the companies according to the amount of capital they have raised. In all three modes of ranking only five topics were found with significant correlations in relation to the capital raised by the venture. All these topics were ranked higher by companies which raised more capital. The topics are: Core Team Expertise, Organization, Customer Relations, Marketing Strategy and Economy. In all five topics, the companies that raised more funds gave a higher ranking. It emphasizes again the high value of investors and experts to the Core Team Expertise (the investors are ready to invest more funds). Customer Relation and Marketing Strategy which received higher score among the successful companies (shown in the next tables) are valued as important also by the investors. Organization is valued higher by the successful companies (relative to unsuccessful companies) but is not considered as a major issue by any group of respondents which is true also for politics.

The following table and chart analyze the difference between respondents who value their companies as successful and those who answered that they don't consider their companies as a success story.

Table 38: t-test for independent samples according to question 11, "Do you view your company as successful" relative to the average of the parameters of each topic in part B (1-7)

	Unsuccessful company		Successful company		t	df	Sig.
	Mean	SD	Mean	SD			
Idea	5.66	1.31	6.08	.67	-1.667	60	.101
Strategy	5.39	1.21	5.70	.81	-1.198	60	.236
Core team expertise	5.39	1.20	5.67	.72	-1.135	60	.261
Core team commitment	6.19	1.32	6.58	.49	-1.607	60	.113
Organization	4.68	1.31	5.30	.89	-2.204*	60	.031
Marketing strategy	5.25	1.05	5.71	.71	-2.058*	60	.044
Customer relations	5.61	1.44	6.17	.70	-2.027*	60	.047
Management	5.27	1.60	5.97	.69	-2.356*	60	.022
Networking	5.16	1.34	5.58	1.17	-1.255	56	.215
R&D	5.22	1.03	5.68	.51	-2.311*	60	.024
Complete product	4.78	1.59	5.55	.89	-2.293*	55	.026
Funding type	4.92	1.32	5.35	1.35	-1.227	56	.225
Politics	3.71	1.77	4.50	1.33	-1.993*	59	.051
General environment	4.69	.96	5.11	.95	-1.723	60	.090
Economy	5.09	1.33	5.48	1.11	-1.247	60	.217

(*) $p<0.05$

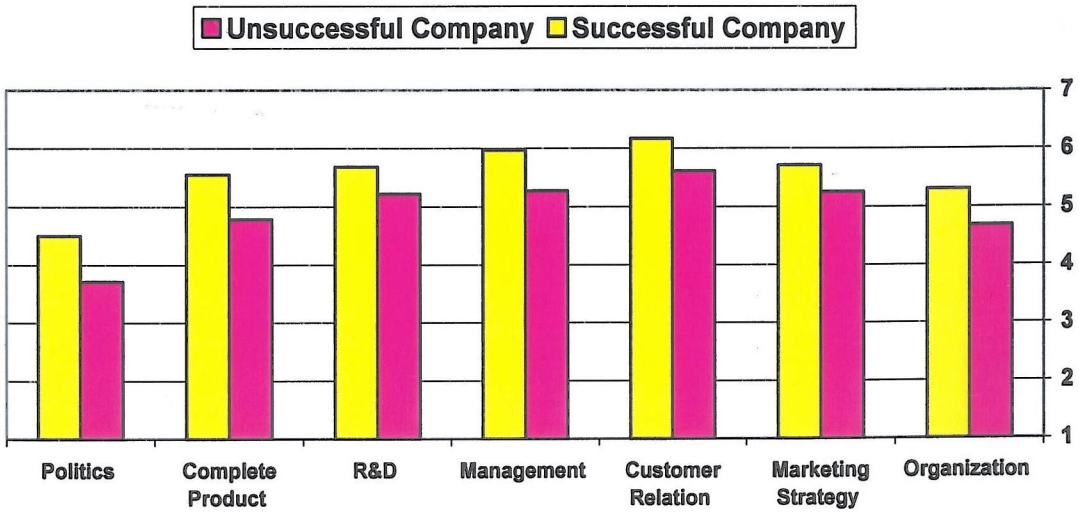


Figure 31: Topics with significant difference comparing successful and unsuccessful companies (Part B - average ranking)

The results of the comparisons can provide some insight for possible reasons separating successful from unsuccessful companies.

Six topics show significant difference between the groups when comparing the average ranking in part B. The topics are: Organization, Marketing Strategy, Customer Relations, Management, R&D and Complete Product. Politics almost meets the criteria. The topics Idea, Management, R&D and Politics were discovered as having significant difference when comparing the summarizing parameter of each topic in part B.

A further analysis of the topics' ranking in part C between respondents who view their companies as successful and those who view their companies as unsuccessful did not reveal any significant differences.

Politics and Complete Product show a relative big difference in their mean score, manifesting again the difference and possibly different attitude to these two subjects. Maybe the belief that politics does not play a role in the business world (at least in some industries) is somewhat naive and is the cause of failure of some start-ups.

4.12.1 Summary of comparing "Successful" and "unsuccessful" companies

The table below illustrates all topics and parameters that show significant differences between successful and unsuccessful companies (according the respondents view) in the ranking of part B. the topics themselves are compared on the summary question of each topic (not the average as in the previous paragraph)

Table 39: A summary of all the parameters which displayed difference between successful and unsuccessful companies (Part B)

	Unsuccessful		Successful				
	Mean	SD	Mean	SD	t	df	Sig.
Idea (as a topic)	5.35	1.413	6.08	.967	-2.441*	60	.018
• Idea meeting needs	5.76	1.665	6.50	.697	-2.388*	59	.020
Organization							
• Employee responsibility	4.65	1.413	5.31	1.142	-2.007*	60	.049
Marketing Strategy							
• New market standards	4.42	1.653	5.17	1.342	-1.953	60	.056
• Product positioning	4.81	1.767	5.89	1.022	-3.001**	59	.004
• Main Market Penetration	5.24	1.809	6.11	.758	-2.567*	58	.013
Customer Relationship							
• Customer needs	5.69	1.644	6.31	.856	-1.912	60	.061
• Customer feedback	5.69	1.619	6.31	.856	-1.933	60	.058
Management	5.50	1.726	6.25	.841	-2.266*	60	.027
• Team solidarity	5.54	1.726	6.28	.659	-2.350*		.022
• Employee development	5.19	1.650	5.83	1.043	-1.842	59	.070
R&D	5.46	1.414	6.17	.747	-2.521*	57	.015
• Innovation level	5.04	1.744	5.94	.984	-2.582*	59	.012
• Product price	5.12	1.608	5.86	1.167	-2.089*	59	.041
Complete Product							
• Independent product	3.75	1.452	5.03	1.354	-3.375**	53	.001
• Complete solution	4.80	1.979	5.72	1.198	-2.169*	55	.034
Politics situation (as a topic)	3.62	1.722	4.60	1.288	-2.557*	59	.013
General environment (as topic)	4.54	1.272	5.14	1.192	-1.903	59	.062

(**) $p<0.01$; (*) $p<0.05$

Successful start-ups believe that the Idea influences the behavior of the start-up. It serves also as a strong tool to raise funds. The venture leaders should have a clear idea and vision and the ability to articulate it in a concise manner. Meeting the needs is naturally an aspect related also to marketing and customer relationship, which is actually part of the marketing efforts. A product that meets the needs and is positioned correctly will enable market penetration. The price has to be suitable for the intended market and relates back to the positioning.

Successful ventures have a high awareness of the complete product importance. The unsuccessful ventures are probably not aware that this topic might be one of the reasons for being unsuccessful. The customers are seeking a complete solution (especially when arriving from a remote vendor) and only a venture selling to OEM can focus on the lower level of providing a subsystem or component. But even then the OEM has to

receive a solution supported by all infrastructures and Integrated Logistics Support (ILS) needed for integration in his complete solution.

Management in general and team solidarity have an effect on the atmosphere and motivation of the workforce and hence on the products and achievements of the venture.

Israeli high-tech start-ups have experienced the difficulties of penetrating the overseas markets. R&D capabilities in general and innovation level to achieve a unique product are a strong tool when arriving at the market. That is the reason these are appreciated by successful companies. Some markets are very competitive and price might have a strong effect on the buying behavior. Successful companies in the market have experienced it more than the companies who have not been successful to sell their products.

In all the topics the ranking of respondents from "successful" companies is higher than the ranking of respondents from "unsuccessful" companies.

It is worth noticing that among the respondents ranking the company as "unsuccessful", the standard deviation in most of the topics is much higher than the respondents ranking companies "successful". This data indicates a big disparity among the respondents of "unsuccessful" companies.

It has to be emphasized again that most respondents' answers included lessons learned from their experience and therefore the answers to the open questions provide most likely their best reflection to reasons for failure of Israeli high-tech start-ups.

Chapter 5 – Summary of the empirical findings

5.1 The start-up contribution, the research method and the future

Based on the literature review and personal interviews the topics and their relevant parameters were identified and the provisional research model was constructed. It was tested together with some open questions in a questionnaire survey distributed to a diverse start-up and investor community. The questionnaire study began with a pilot survey which helped to implement some additional points and clarify others. The analysis of the pilot and final questionnaires demonstrated high reliability.

There were 79 responses to the questionnaire, 69 from start-up senior managers (about 50% represent CEO/Presidents) and 10 from experts comprising investors and consultants. About 60% of the respondents have a second or PhD degree. The start-ups represented in the research are in different stages, exist different periods of time (some of them are already closed), are of different sizes (most have less than 100 employees, which is a typical size for start-ups) and reflect all the main sectors that are conventional in the Israeli high-tech start-up arena. Their distribution is very similar to the distribution of funds invested by VCs during 2002/03. The respondents have ranked all the topics and their corresponding parameters and enabled to verify the validity of the model while highlighting the issues of great importance. The results of the analysis were employed to construct the final research model.

There are some signs that the economy that suffered from recession, starting in 2000 accompanied by the NASDAQ crash, is slowly recovering. In the era of recession capital was limited and high-tech start-ups suffered from difficulties to raise funds. Since the end of 2003 VCs are increasing their investments in start-up enterprises and some of the companies which adapted a survival strategy can return to normal activity. Deloitte-Brightman-Almagor (2005) conclude in their 4th quarter of 2004 Israel VC indicator survey that after three slow years, 2004 has proven to be a turning point for the high-tech industry. They acknowledge that VCs have begun raising new funds, investment levels are increasing as are the companies' valuations. As continuation of the renewed positive trend started in 2004, the VC community has even more positive expectation for 2005.

5.1.1 Summary of the topics and parameters ranking

In the questionnaire we first asked our respondents (in part B) to rank each of the 15 topics and its associated parameters on a Likert scale of 1-7, where the score 7 was the "most important". Respondents were also asked

questions related to details of the topics to find any additional issues. Table 40 summarizes the ranking of all the topics and their parameters as graded by the respondents in Part B.

	Mean	SD
Idea	5.89	1.240
Idea formulation	5.87	1.390
Idea meets customer needs	6.27	1.136
Core team expertise	6.13	1.018
Team diversified experience	5.95	1.142
Team former experience	5.04	1.490
Team leadership capacity	6.32	1.183
Consultants	5.24	1.478
Investors' contribution	4.64	1.450
Organization	4.95	1.327
Employee definition of responsibility domains	5.08	1.238
Few organizational levels	5.19	1.368
Human relationship	6.15	1.110
Customer needs	6.15	1.167
Customer buying behavior	6.16	1.126
Feedback implementing	6.15	1.167
Market receptivity	6.11	1.173
Continual sales	5.53	1.588
Management in general	6.05	1.250
Management style	5.27	1.588
Team solidarity	5.99	1.204
Employee development	5.63	1.300
Networking in general	5.46	1.241
Complete solution	5.36	1.485
A gadget	4.64	1.455
Complete product	5.39	1.561
Cooperation in R&D	5.31	1.528
Cooperation in marketing	5.71	1.426
Funding Type	5.31	1.303
Political situation	4.34	1.553
Political environment	4.39	1.658
Security situation	4.26	1.708
General Environment	4.96	1.219
Military service	4.45	1.730
Entrepreneurship education	4.85	1.387
Availability of skilled workforce	5.64	1.259
Government support	4.89	1.420
Cultural and social norms	5.18	1.325

	Mean	SD
Strategy	6.00	1.140
Mission statement	5.30	1.555
Industry analysis	5.99	1.138
Strategy clarity	5.09	1.487
Strategy update	5.82	1.295
Core team commitment	6.47	.936
Core team association with goals	6.46	.921
Core team motivation	6.58	.919
Marketing strategy	6.17	1.088
Market expertise	6.03	1.240
Marketing plan	6.01	1.051
Marketing research	5.08	1.457
Market growth	5.22	1.324
New market standards	4.78	1.533
International market penetration	5.69	1.252
Market dynamics	5.75	1.286
Patents registration	5.36	1.751
Perceived utility	6.34	1.120
Distribution channels	4.63	1.538
Product positioning	5.56	1.383
Marketing R&D relationship	5.96	1.265
Main market penetration	5.92	1.285
R&D capability	5.95	1.038
Technological manpower availability	5.78	1.141
Defense technology and infrastructure	4.23	1.806
Development team	5.95	1.161
Innovation level	5.70	1.358
Technological breakthrough	5.34	1.353
Easiness of adaptation	5.55	1.341
Product quality and durability	6.12	1.256
Product price	5.71	1.346
Time to market	5.41	1.480
Economy Situation	5.43	1.271
Global economy	5.63	1.340
Domestic economy	4.79	1.586
Availability of financial resources	5.82	1.246

Table 40: Summary of all topics and parameters ranking in Part B

The data analysis shows that the topics can be divided into two main categories. The first category includes the topics with high importance for success. This group contains eight topics, Core Team Commitment, Core Team Expertise, Idea, Strategy, Marketing Strategy, Customer Relations, Management and R&D Capacity. The second group contains those topics perceived as less critical for success and includes, Networking, Funding type, Economy, Complete Product, Organization, General Environment and Politics.

The next part of the questionnaire (Part C) was used to obtain better discrimination between topics since respondents were asked to focus on the topics' ranking. They were asked to classify the topics into one of three groups, very important, important and less important and afterwards to rank the topics within each group. This provided us with the possibility to establish an overall rating of 1 (the most important topic) to 15 (lowest importance) for each of the topics. The final part of our study involved asking half of our respondents to comment on the results of the general survey (Delphi method). Figure 32 is a summary of the rankings and compares the overall ranking in part C with the outcome of the Delphi method ranking.

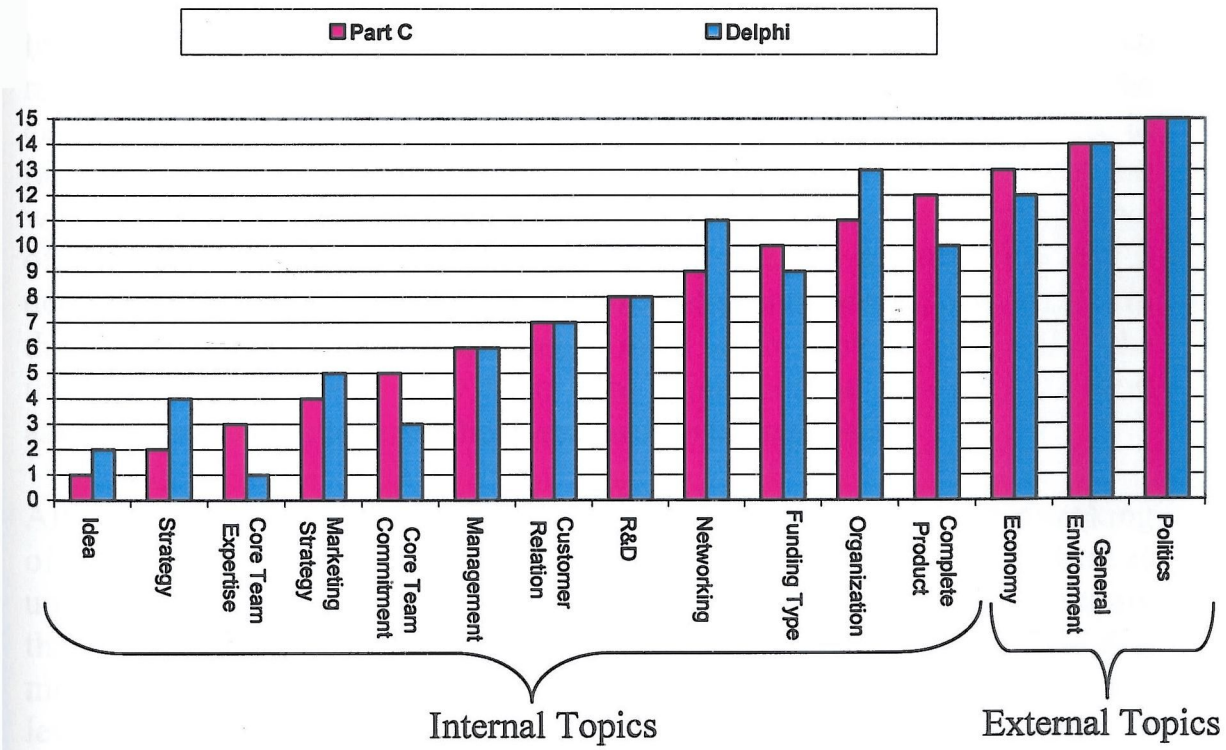


Figure 32: The topics' ranking results

The results again emphasize two distinct groups; the first containing the seven topics with high importance and the second with seven topics

perceived as having lower effect with the subject of Research and Development (R&D) providing a buffer between the two groups with strong indications it belongs to the first group. Whilst we acknowledge that the Delphi method does have the effect of averaging responses, it also lends support, as expert confirmation, of the critical importance of the top rated factors. Although the comparison illustrates minor disagreement about the relative ranking of the critical components, it demonstrates a broad trend of agreement about the relative importance of the different topics. The primary group that contains 8 topics deemed of highest importance and the 7 topics of the secondary group with a lower impact are clearly delineated. Both groups consist of the same topics identified in part B of the questionnaire. In part C and the Delphi ranking there are five topics which are deemed to be very important and are ranked at the top. This implies that all features associated with the core team (commitment and expertise), the idea, strategy and marketing are considered critical for the new high-tech venture. Customer relationship, management and R&D also belong to the high impact. Less important topics are networking, funding type, the economy, the complete product and the organization while the external factors of general environment and political situation are ranked at the bottom (as in part B) and apparently have the lowest influence on the fate of the start-up.

In the ranking of part C and Delphi method the idea and strategy were ranked much higher than in part B. Thus overall, the emphasis amongst the critical factors moved towards product and the strategy. The differences in ranking don't have scientific evidence. However, it does seem possible that when forced to consider the relative importance of each topic, the objective of part C, our respondents, recognized that without a good idea and a decent strategy to make it work, the other elements became secondary. In the first section, where respondents rated each topic individually, the importance of the team may have been prioritized on some sort of tacit assumption that the idea had been reasonable to begin with.

Although there were some differences in the scores attached to the ranking of the topics between companies defined as successful and those defined as unsuccessful or between the ranking of experts and the start-up community the overall positions in the rankings were very similar. It manifests that most people involved in start-up activities have similar opinions about the level of importance of the different issues, some of it gained probably by similar real life experience.

As a summary to the comparison between the respondents I divided the represented companies into two groups. The first set represents hardware

companies (such as communication and electronic systems) and the second set represents science and IT companies (Internet, software, life science, biotechnology). Table 41 shows the result of the comparison between the rankings of those two sets according to the ranking of the topics in part C (a ranking of the scale 1-15). We can once more clearly observe the two groups of the first 8 high priority topics and the next 7 topics with lower importance, while the list of the topics ranked in the first six places, idea, marketing strategy, core team expertise and commitment, strategy and management and those ranked in the last two places, general environment and politics contains the same topics.

The only significant difference is in the organization topic. Hardware based companies give it a rather lower ranking (13th place) than Science and software companies (9th place). But still in both groups organization belongs to the group of topics with lower importance as was the case in all other rankings.

Table 41: Comparison between Hardware and Science ventures

	Hardware company		Science company		t	df	Sig.
	Mean	SD	Mean	SD			
Idea	3.56	3.222	4.17	3.944	-.509	34	.614
Marketing strategy	4.11	2.423	5.44	2.915	-1.492	34	.145
Core team expertise	4.44	2.382	4.44	2.706	.000	34	1.000
Strategy	4.72	3.707	3.78	2.290	.920	34	.364
Core team commitment	5.06	2.235	4.72	2.986	.379	34	.707
Management	5.67	3.290	5.39	2.913	.268	34	.790
Customer relation	5.83	1.948	6.83	3.185	-1.136	34	.264
R&D	7.29	2.823	6.50	2.572	.871	33	.390
Funding type	9.53	3.520	11.28	2.347	-1.738	33	.091
Networking	9.76	2.635	9.50	3.130	.270	33	.789
Complete product	10.53	3.085	10.33	2.931	.193	33	.848
Economy	10.94	3.733	11.67	3.199	-.619	33	.540
Organization	11.22	2.130	9.17	3.451	2.150	34	.039*
General environment	13.00	2.449	12.83	1.790	.231	33	.819
Politics	13.82	1.629	13.94	1.392	-.237	33	.815

5.1.2 The research results yielding the updated model

All the topics and parameters identified during the research were found to have an effect on the start-up success. As expected some of the topics are of high importance and need considerable attention by the management, while some might have a lower impact on the success. Within each topic some parameters were found to have greater influence than others do. The final questionnaire included open ended questions intended to tap into different types of responses to enquire about issues not suited to closed

questions or to identify items that we had not anticipated. The analysis of the interviews and questionnaire discovered the main topics and parameters that are fundamental for the success of high-tech start-ups.

The mean scores of the rankings of the topics and their associated parameters in table 40 clarify their level of importance. The lowest score of all ranking is 4.23, manifesting the importance of all subjects exposed in the research model. However there is still a significant difference in the level of importance of the different topics and parameters. This is illustrated by the fact that several of the topics and parameters received ranking scores of close to 6.00 and above and even up to 6.58. It proves that the topics and parameters have to be split into at least two groups, those with high importance and relevance for success and those with lower importance.

Core team commitment was ranked very high (first place according to part B and 4th place in part C) and both of its parameters in the questionnaire are ranked at the top of the list: Team motivation (6.6) and association of the leading team with the start-up goals (6.5). It probably manifests the crucial importance of the core team as more important than any other parameter. Many claim that with a strong and committed team the start-up will succeed. The market might shift to new directions; the strategy could change, but in the end people create the success. A high quality of core team will be able to adapt and continue the fight until success is attained. Team motivation and identification with the venture goals is probably associated to the unique environment in Israel. People show pride in their involvement in start-up activities. The labor in Israel tends to remain in the same workplace for a long period and demonstrates high level of loyalty. The team is ambitious to succeed and its association with the venture' goals increases the team motivation and consent for hard work which is necessary (but not sufficient) to attain success. The interviews raised the point of big wastes during the era of prosperity in funds and emphasize the importance of top management modesty and parsimonious behavior.

Since the core team was identified as vital for success its expertise in fulfilling the goals is obviously imperative. High importance was assigned to the leadership capability (6.3) and to the diverse experience of the team (6.0). Former experience was, quite surprisingly, ranked very low (5.0) maybe because it was not seen as belonging to this family of parameters describing core team expertise. In contrary the interviewees placed high emphasize on the former experience of the core team and especially the CEO experience and leadership qualities. The investors' contribution to this topic was evaluated as very low (4.6). This is probably because of the

disappointment from investors. Open questions and interviewees revealed the possible contribution of investors and the need of fit between the investors and the companies' culture and goals.

The topic Idea was also ranked very high (1st in part C, 3rd in part B) and therefore its parameters are ranked high. The need to meet customer needs (6.3) is no doubt the essence of the business if it wants to succeed in the market. Too many start-ups are developing interesting products with innovative high-technology but with no real need in the market. Often the appearance is too early, before the market is ready to absorb the technology. A good example is the proliferation of products that appeared in 2000 and 2001 intended for the third generation of cellular communications. Those products were just too early in the market. The third generation was delayed and most of the start-ups dealing with those products collapsed. Only a few of those companies, which had committed people and the vision and leadership, were able to adapt intermediate solutions and survive.

Strategy is another topic identified as having high importance. Strategy must be based on the current industrial situation and foreseeable future trend analysis and on frequent revisit and adaptation. Clear strategy at the outset and a sound mission statement are not viewed so important because of the typical start-up dynamic situation which requires high flexibility in the strategy formulation and revision. The open questions revealed the Israeli tendency for strategy myopia; although 62% of the respondents believe that the start-ups should be built with a long perspective. In actuality the companies tend to think in the short run without sufficient planning for the long run and many of them focus too much on technology.

Marketing is identified in many studies as one of the most vital topics to the success of a business in general and high-tech business in particular. Also this study manifests the importance of marketing strategy although not ranked at the first three places. Probably start-ups are too busy with survivability in today's economy that they don't even recognize that lack of proper marketing strategy might be one of the main killers of their entity. But still respondents gave high importance to marketing strategy and particularly to the product perceived utility (6.3), the comprehensive acquaintance with the market (6.0), reliable marketing plan (6.0) and the marketing and R&D relationship (6.0). Developing products to set up new standards in the market received a low score. This point was supported by the interviews which suggest avoiding such products as much as possible because they involve time consuming and costly activities of market education. The interviews and open questions added some other points.

They emphasize the weaknesses of many Israeli start-ups as: lack of creating a sound marketing department and starting marketing activities at an early stage; insufficient allocation of funds to marketing activities yielding compromises in selection of marketing staff; no consensus and focus on a marketing niche which is attractive enough; no good use of often required marketing experts or consultants. A vast majority of the respondents (86%) agree that a start-up should focus on a niche market. The marketing staff should have a mix of Israelis and foreigners (84%) but the location(s) of the staff should depend on the goals and the marketing strategy. The respondents did not attached high scores to the issues of supporting distribution channels (which always seem to be low in priority until the venture has meaningful sales) and on the issue relating to new markets with new standards. Most of the surveyed companies (70%) assess that they do not directly rely on defense technology.

Management is also a topic identified with high importance. Team Solidarity within the enterprise was observed important (6.0) since it is the counterpart parameter of "core team association with goals". The style and development of employees are not seen as decisive parameters. The open questions emphasized the lack of skilled professional management in Israel with international experience.

The human relationship with customers is another driver of high value critical to attain sales. Once sales have been started a major milestone has been achieved. Almost all parameters related to this topic are considered to have high priority. Personal acquaintance, understanding the customer's buying behavior and implementation of feedback scored 6.2 and market receptivity for the product has received almost the same priority. The interviews emphasized the point of listening to potential and existing customers and dealing appropriately with cultural differences. Opportunities for continual sales are of somewhat lower importance (5.5), which is probably the situation in most start-ups that are still concentrated on initial sales. In Israel the high-tech start-up are very much driven by technology and evidently the necessity to meet customer needs is one of the lessons of past experience.

R&D is the last topic in the group of high priority. The parameters identified as crucial for successful R&D, and influence the products features, are product quality/durability (6.1) and a qualitative R&D team (6.0). The interviews pointed out the risk of making short cuts in R&D activities and the advantage of existing technologies and skilled manpower in Israel. Although much of the high-tech has roots in defense technologies these parameters are not considered of high importance (4.2) for the

success of Israeli start-ups. The open questions discussed the capability of easy adaptation to different cultural needs or contiguous markets for expansion, is a valuable trait. The enterprise should avoid perfectionism of the product which might create unwarranted complexity and detrimental delays in the market introduction, sometimes causing the window of opportunity to vanish. There is an agreement (70%) that R&D outsourcing is usually not required for success but external consultants with specific expertise can be very helpful in specific circumstances.

The topics which are considered to have lower importance on the success chances of a high-tech start-up are: Networking, Funding Type, Organization, Complete product, Economy, General environment and Politics.

Within these topics there are some parameters that deserve attention since they might have a stronger effect on the start-up outcome than other parameters.

Areas in which networking can add high value are marketing (to open doors into the target market niche), finance (to assist future fund raising) and technology (to support R&D).

Funding type is considered in general as having low importance. Primarily due to the disappointment of expectations that the investors' (primarily VCs) will assist (usually via the board in which they participate) in defining the path and strategy and with contacts in the markets and with investors for future fund raising. But funding itself is a critical issue. Costs of R&D and market penetration are often underestimated. Funds availability is influenced by many factors and therefore a major of the respondents agree that the start-up should make efforts to raise funds whenever possible and not wait till there is a real depletion of funds. Venture Capital is a young industry in Israel and was quite inexperienced in the 1990s. Today VCs are mature and much more prudent and conservative. VCs can frequently provide added value in different fields of expertise such as strategic planning and can assist from time to time in critical domains of recruiting senior management, strategic cooperation with overseas partners, opening doors to targeted markets among others. Some VCs have international contacts which can be positively utilized and add the international wisdom and analysis of the markets and their trends. Investors seek to have a feeling of the funds needed at each phase and lose confidence when corporate targets are not reached. On the other hand most respondents prefer not to see intervention by investors in the daily start-up management. The notion that funds should be raised when possible and

waiting until funds are depleted is a bad strategy was confirmed by 80% of the respondents.

The organization and its parameters do not have a strong effect on the start-up success. There is no preferred formula for the organization as long as it is done with common sense, nor is there any clear preference for formal or informal organization of the start-up entity. Poor organizational culture can have negative effect on the results.

The issue of complete product is somewhat cumbersome and therefore might be misunderstood by some respondents. Although a complete solution was not ranked very high (5.4), it was ranked higher than a device/gadget solution (4.6). Marketing cooperation (5.7) and R&D cooperation (5.3) were also not evaluated very high. The level of importance really depends on the start-up and marketing strategies. In general, it is known that the market is seeking a complete solution. This, however, can be done on the level of the marketing of the whole solution or via OEM. An OEM also requires comprehensive support but only on the subsystem/device it receives from the start-up.

The economy is not seen as a main driver for success. But availability of funds (which are related to the economical situation) is quite important as is the global economy status. Start-up companies will have to adapt to the decreasing availability of funds during downturns in the economy. The domestic economy is perceived as having little effect on the start-up.

Most of the General environment parameters have low importance. The influence of military service, entrepreneurship education/training and government policies and support were ranked very low. But it is worthwhile to mention that the military service has an indirect effect on different capabilities of the young generation some of the skills such as improvisation and creativity, encouraged during the military service are very helpful for start-up regimes. These effects are not always considered when ranking the importance of a parameter.

The political situation and its parameters and the political environment with respect to the security situation in Israel had the lowest ranking (4.3 and 4.4) respectively. It could be interesting to explore if this notion is not wrong because of some ignorance and misunderstanding of the real business world behavior (especially when trying to sell to OEMs). Since start-ups have no influence on this domain it is not conceived as necessary to know the "correct" situation. The start-up can change its behavior only in the case it has an OEM strategy, which he might alter in case it is proven

that politics hinders the success of marketing products to the final companies (OEMs) which provide the "complete solution" to the market.

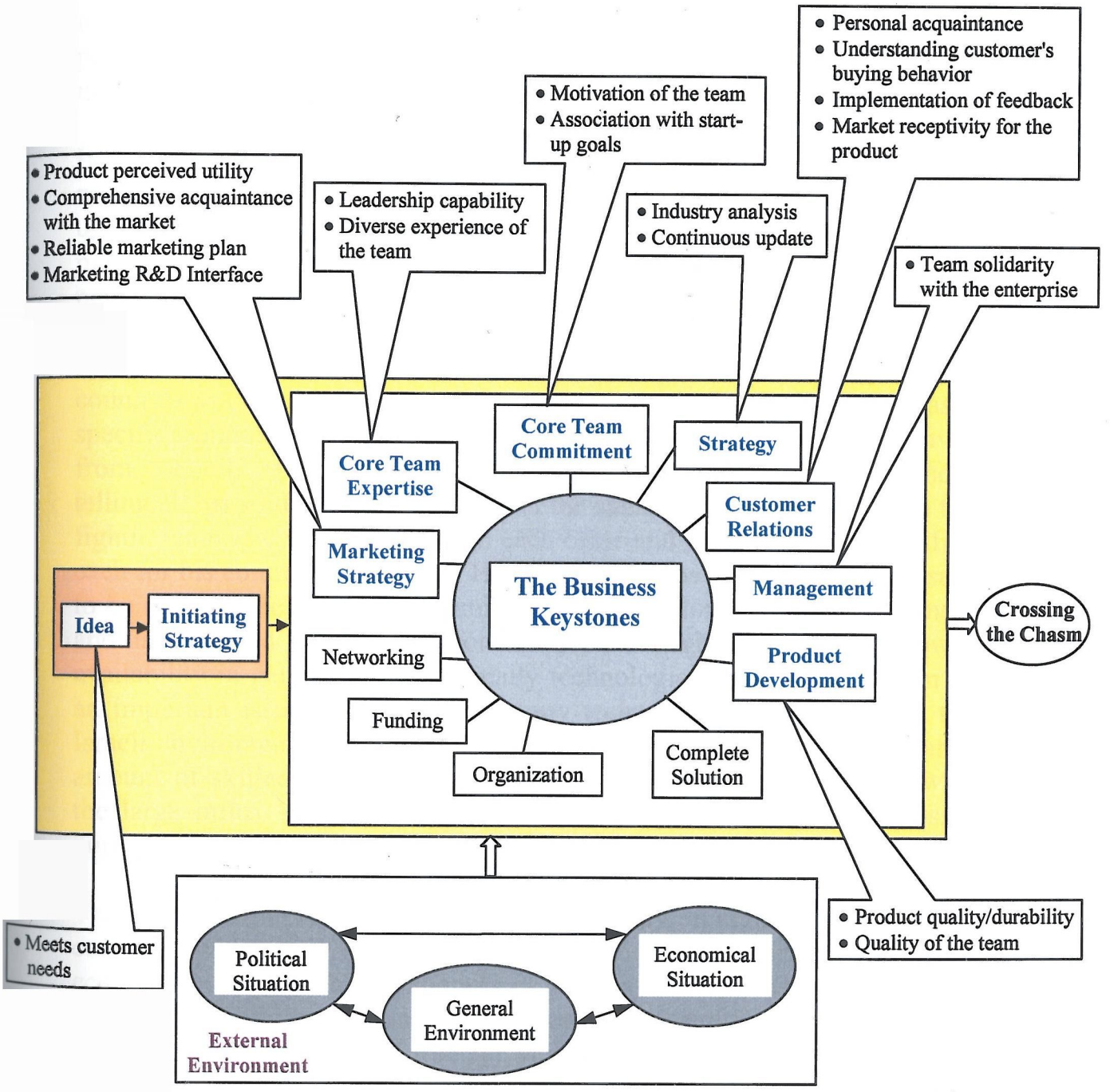
Some additional points observed from the open questions and interviews are as following:

- Strategic alliances can be very helpful in penetrating the overseas markets, a crucial point for markets which have a limited domestic market and their success and even survivability depends on foreign markets;
- The employees are a scarce resource and valuable asset in a high-tech start-up, hence the selection of employees should be performed with much deliberation;
- The interviews and open questions suggested repeatedly the importance to consult with people who have knowledge, experience and expertise in different domains, to carefully listen to their advice and consider its implementation.

One has to bear in mind that the research was conducted in a difficult period for the high-tech start-up industry. This is apparent by the fact that most of the start-up companies do not meet the criteria for success constructed by the interviewees who are among the leaders of those companies. For example among 24 respondents representing companies existing between four to eight years, 17 respondents expected their companies to have high growth or growth with profits, while only 5 companies are meeting this criteria.

Figure 33 depicts our final model. The model highlights the topics deemed to be critical for success (the group of topics with highest importance) and describes the key factors belonging to these topics. As can be observed the important topics namely, the idea; strategy; core team commitment; core team expertise; marketing; management; customer relations and R&D are relevant for start-ups in general and not unique to the Israeli environment. All the external topics belong to the group with lower effect on the start-up success.

Figure 33: The final research model



5.1.3 The Israeli aspect of the research results

As can be observed the important topics and parameters are relevant to start-ups in general and do not represent a situation specific to Israel. The research results identified some parameters more specific for Israeli start-ups but those were not at the top of the ranking. Table 42 describes the parameters which have received relatively high scores (above 5.6) and are more specific to the Israeli environment.

In the Israeli case the targeted market(s) will always be international market(s). The Israeli market is too small to support even a high-tech start-up. At the best the domestic Israeli market could serve as a test site for the products during the development and prototype testing phases. The penetration of the international market is therefore an important issue relevant for Israeli high-tech companies which cannot survive without those markets, but the same is true for similar ventures located in small countries with a limited size of domestic markets. Team solidarity has a specific connotation in the Israeli environment. The association arrives from the military service in which the notion relates to the commander telling all his soldiers "after me" but at the same time all the soldiers in the fighting unit know they depend on each other and are disposed to sacrifice each for his comrade in the unit. High-tech start-ups in Israel are often said to be comparable to a fighting unit in which everyone is doing his utmost and is prepared to sacrifice for his mates. Highly skilled manpower availability in general and specifically technological manpower is seen as an important issue. This is true for any technological enterprise but the Israeli environment with its high level education system provides a large amount of skilled and technologically proficient labor and together with the large influx of educated and skilled immigration wave from Russia during the 1990s strongly supports these needs.

The global economy has a strong effect primarily on high-tech start-ups in countries with small domestic markets, relying on export markets. The economy influences the willingness of overseas customers to buy new and innovative products in general and from small and distant start-ups in particular. Although this is true for ventures in many small countries the effect is stronger on Israeli start-ups since the financing of new high-tech ventures largely depends on capital arriving from foreign investments in Israeli VCs. Those funds strongly depend on the global economical situation.

Table 42: Important parameters related to the Israeli circumstances

Marketing strategy • International market penetration • Main market penetration	Economy Situation • Global Economy • Availability of financial resources
Management • Team Solidarity	General Environment • Availability of skilled workforce
R&D • Technological manpower availability	

Some of the weaknesses identified in the open questions may also be more specific to the Israeli situation. The lack of experienced management with global vision is specific to the Israeli environment but might also be relevant for some other countries. Also the relative deficiency in many aspects of marketing is typical to countries such as Israel which are isolated from their main markets and possess a different culture and tradition. Another point raised by some respondents is the lack of modesty which again is somewhat associated with cultural behavior but was more ordinary during the bubble era.

5.1.4 Cross Analysis of ranking

The next table (43) summarizes the differences discovered in the analyses. Although there were no major changes in the rankings of the different groups classified in the analysis it is worthwhile to mention the areas in which changes are revealed. This can be a sound basis for a further study focusing on the differences between successful and less or un-successful start-ups. A cell which is marked in the first column means that there was a difference between the ranking of Young, Successful and Surviving/Closed companies. A mark in the second column shows difference in the ranking between respondents who perceive their companies as successful and those who evaluated their companies as unsuccessful. The third column represents differences between rankings of respondents based on the amount of capital their corresponding ventures have raised. The fourth column marking indicates a significant difference in response to the topic between experts and start-ups. A mark in the last column (Y) means that the topic emerged as important in many of the interviews.

X – Means a significant difference
√ - Means a differences at the significance level of $0.05<p<0.10$.
Y- Means it was often mentioned as a major issue during interviews.

Table 43: Comparison of differences in ranking among groups

	Young/ Successful/ Surviving or closed	Successful/ Unsuccessful	Fund Raising	Experts	Interviews
Idea					
Strategy					
Core team expertise			X	√	Y
Core team commitment					Y
Organization		X	X		
Marketing strategy		X	X		Y
Customer relations		X	X		Y
Management	√	X			Y
Networking					
R&D	√	X		X	Y
Complete product		X			Y
Funding type				√	Y
Politics	X	X			
General environment	√	√			
Economy			X		

Core Team expertise (including the CEO) received high ranking by all respondents but was identified as more important by companies who raised more capital, by experts and was emphasized by the interviewees. The core team is the group that has to navigate the company and lead the adaptation when needed, for example when the market is shifting. A diversified, experienced and committed team (highlighted by the interviewees) can make the necessary changes and bring the start-up to create the required adaptation.

The Organization of the company is seen by successful ventures, by companies which raised higher amounts of capital and by science and software companies as more important, but was not ranked particularly high by any of these sectors.

Marketing strategy and Customer Relations belong to the more important group of topics but received higher value from successful companies and companies who have raised more money and are often mentioned by interviewees. The investors evaluate the marketing capabilities and relation to customers before investing capital in a start-up and successful companies know that without a sound marketing strategy, a strong marketing staff and close relation to the customers goals (primarily sales

goals) can mostly not be achieved (Sales is always a main goal unless the company is acquired before starting sales).

The Complete Product does not appear as a major topic but was of higher importance to successful companies and was brought up during the interviews. As mentioned before possibly the notion of "Complete Product" (providing a complete solution) was not fully comprehended.

The management has a strong effect on the culture of the company and employees' motivation and therefore strongly influences the venture accomplishments. That is the reason Successful companies and interviewees have a high priority to this topic.

R&D is the tool to fulfill the elementary need of creating products for the market. The successful companies and experts don't take it for granted that the venture will achieve successful results even if there is a sound idea behind the product. The R&D department needs good and experienced staff with some bright people applying and implementing innovation into the products. The suitable product ties back to the marketing strategy and customer relations topics, all of these activities should guide the organization to develop the appropriate products.

Experts (which include the investors) consider the Funding Type more important than the start-up community. But also the interviewees mentioned the Funding Type, in the aspect of the match between the investors and the company and the influential role of the investors on the company fate while having a strong voice in the board of Directors.

Politics is usually neglected and receiving low importance. Successful companies have probably more experience in the market to evaluate the possibility of politics to influence customer decisions. The customers are mostly big organization with internal politics and sometimes even external political influence.

Successful companies also consider General Environment as more important because of the effect it has on areas such as availability of skilled manpower, government support, and quantity and quality of education. All these have a clear indirect effect on start-ups.

Companies who raised more funds have higher appreciation to the influence of the economy on the company success.

5.1.5 Hypotheses

The hypotheses suggested at the end of chapter 1 of the research are of a qualitative type and intend to support the research model outcome, and not hypothesis which can be accepted or rejected statistically. The research results attest the following outcome regarding the hypotheses:

1. Israeli start-ups share comparable factors influencing their success.
   The results have clearly proved that there are subjects and parameters referring to each subject that a vast majority of the respondents clearly indicated as critical for the Success of an Israeli high-tech start-up. On the other hand there are subjects and parameters which are clearly not critical for the success of the start-ups. The updated model distinguishes between the subjects and indicates the important parameters of each subject.

2. Business strategy is a main tool. A topic that must be planned, and frequently updated, according to the dynamic changes in the markets.
   The business strategy has received top ranking (2nd place in part C). The parameters received the highest importance are: industry analysis of the current situation and foreseeable future trends (6.0) and frequent adaptation of strategy (5.8).
   The interviews stressed the need to have a clear business plan driven by customer forces and market dynamics and to be market and not technology driven. The open questions stressed the Strategic Myopia as a decisive factor hindering the success of the start-ups.

3. Marketing strategy and planning are decisive factors for the success of Israeli start-up ventures. The main reasons for failure are connected to lack of understanding the market place.
   Marketing Strategy was highly ranked among the topics (4th place in part C). Respondents gave very high magnitude to marketing strategy and particularly to the product perceived utility (6.3) the comprehensive acquaintance with the market (6.0), reliable marketing plan (6.0) and the marketing and R&D relationship (6.0).
   The interviews as well as the open questions asked about reasons for failure or success of start-ups mentioned marketing strategy as one of the most frequent answers. The points mentioned relate to: Intimate knowledge of the market, creation of a sound marketing strategy, selection of an adequate market niche, continuous update of the strategy and expansion plans and belatedly and/or poor arrangement, staffing and funding of the marketing department. The inferiority of Israeli products (due to the arrival from a remote country) arriving in the market was also mentioned as well as the idea to avoid (as much as possible) education of the market for new operational procedures.

4. Most of the start-up companies lack management skills and experience

The main argument for failure of Israeli start-ups was in regard to skilled professional management. The management subject was also ranked in the 6th and 4th positions (part C and part B respectively) showing its high relevance to the business success. In this aspect team solidarity within the enterprise received a high score (6.0).

The interviews as well as the open questions emphasized the subject of professional management as a key topic regarding the opportunities to improve Israeli start-ups' performance and to the main reasons for failure of Israeli start-ups. The interviews emphasized also the lack of professionalism within the board of directors and the need to avoid waste of resources. Answers to the best advice for start-ups highlighted several management issues such as courageous changes in management, management experience and modesty.

5. Entrepreneurs and the core team are critical elements (as the heart, brain and driving force of the venture) but frequently impede the flexibility of the decision-making process hence preventing or postponing necessary changes.

Core team Expertise and Core Team Commitment were ranked between the 1st place (Core Team commitment in Part B) and 5th place (in any ranking method) manifesting their high importance.

The Core team commitment parameters motivation of the team (6.6) and association of the leading team with the start-up goals (6.5) received the highest scores. The important parameters of team expertise are leadership capability (6.3) and diverse experience of the team (6.0). Interviews and open questions reveal the core team decisive role. Interviews and questions relating to improving start-up success and reasons for failure stress the need for professional, experienced, harmonized, crystallized and committed core team. The interviews emphasize the need for a diversified and synergetic team with expertise in the specific industry and utilization of consultants/experts in critical fields.

The entrepreneurs have not been scrutinized separately and are part of the management topic, but the strong influence of the founders was declared. The CEO is the leader who bares a critical factor in the venture success and defines the company culture and the strategy. The need sometimes to promptly replace the CEO (often one of the founders) was stressed by some interviewees.

6. <u>VC funds are mostly interested in bringing the start-up to IPO as soon as possible and are not looking at the long-term objectives.</u>
This point is in a debate and there is no consensus on the VCs objectives and motivation. Most start-ups agree that the VCS can assist in formulating and updating the strategy and business direction. They can also assist with their contacts to open doors in the marketing place and in fund raising. But most start-ups would not like VCs intervention in the daily management of the enterprise. Some managers mention that the VCs interest could be in conflict of interest with the start-ups leaders who like to grow a successful business in the long run while VCs suffer from greediness and want to see quick results to their investment even at the expense of selling the venture to foreign companies.

Bainerman (2002) claims that VCs are solely concerned with quick exits and not with, the once noble concept of, building enterprises for the long term and for the benefit of the entire country. Some claim Israeli VCs prefer to invest in companies whose entrepreneurs are open to mergers and acquisitions. VCs on the other hand claim that only business considerations drive their decision making process. That is the only way they can succeed in making profits and raising new funds for the benefit of the high-tech start-up industry in Israel and the Israeli economy as a whole. This issue in unresolved.

7. <u>The Israeli security situation, economy, and distance from the markets have a comparable and decisive effect on the different start-ups.</u>
The political situation as a whole received the lowest ranking and so was its parameter related to the security situation in Israel (4.3). It is not clear (and will have to be explored in a different research) if this perception is true or a misconception due to innocence.
Also the economy was ranked low (13 in part C and 10 in part B). The Global Economy (5.6) and availability of finance and other resources (5.8) received a higher importance and can not be ignored.
Still the issues suggested in this hypothesis can not be accepted as decisive factors influencing Israeli start-up success.

Chapter 6 - Conclusion and Recommendations

This chapter focuses on the research conclusion. Later a short presentation of the research limitation is presented. Since the model is very comprehensive and might be useful for start-up companies around the world the thesis concludes with propositions for future research which could lead to a formation of a multi-dimensional robust model with wide applicability.

6.1 Conclusions

The struggling state of Israel is striving for economic independence. The contribution of the high-tech industries to the Israeli economy and the significant ingredient of the start-up sector are very prominent. But the success rate of high-tech start-ups is still low and during economical recession even survivability becomes difficult.

The research objective was to establish a comprehensive model for high-tech start-ups assessment and improvement. Former comprehensive models as Bell-Mason's model (Bell and McNamara, 1991) and the business platform of Davidson and Klofsten (2003) have the advantage of representing some level of dynamism in their models but are missing some of the factors influencing the start-up destiny, especially the ones related to the external environment. The idea of this research was not to find conflicts or to refute findings in previous studies but to use the literature as a tool to identify the most relevant issues for start-up survivability and success. In some events that a contradiction was found a relevant question was formulated and integrated in the study to explore the best solution.

The attempt to establish a practical model for comparison, application and use for nascent, emergent and growing companies in the high-tech sector has been successful. The fact that the model is based on broad literature review and qualitative research ascertains some external validity. The action based model is clear and simple and can assist high-tech start-up companies in assessing their situation and take corrective actions to improve the probability of success. The data gathered shows a high level of consistency and reliability. The derived model describes the topics and parameters that influence the success of Israeli high-tech start-up ventures, while emphasizing those with greater importance. The results demonstrate two categories of topics; those of the highest importance and those ranked less critical. The first group includes, the commitment of the core team; the cor team expertise; the idea itself; strategy in general; marketing strategy; customer relationships; management and R&D capacity. The topics

identified as less critical are networking; type of funding; the economy; a complete product; organization; the general environment and politics.

The finding of the research seemed to be robust since they demonstrated a high level of conformity and there were no meaningful differences in the responses of the different sectors. The effort to find differences among the different industrial sectors or among successful and unsuccessful companies yielded only marginal results. For example successful companies gave the politics topic and the complete solution a much higher score but still the overall ranking was at the bottom of the list. They also provided higher scores and rankings to the R&D and management topics but both groups classified the topics as belonging to the category of issues with high importance. The economy is also seen by some sectors as more important. The successful companies, companies which raised more funds and hardware based companies who probably require more funding rounds before attaining success appreciate the impact of the economy state on the availability of funds.

Some considerable lessons for many start-up ventures can be learned from the research results which are summarized in the following points.

- The research clearly manifests the value of the people. In the business world involving high-technology, where creative thinking and comprehensive understanding of the volatile markets are vital for success, the most important asset seems to be an excellent and motivated staff. This deviates from the thinking in the MIT/Boston Area, which believes that a large part of the start-up leading team should be replaced after each stage with other managers who are more adequate for the next step. The implications of retaining the staff are that the company has to find means to attract and retain its leading employees. The entrepreneurs should be trying to create an atmosphere and motivation, so that all employees should feel as part of a cohesive team that is reaching for the same dream. It is interesting that a recent study by the consulting organization Deloitte-Touche-Tohmatsu (2005), in a recently performed high-tech CEO survey, found that the factor that contributed most to the growth of the involved high-tech companies in 2004 was high-quality employee and one of their biggest challenge was finding, hiring and retaining qualified employees.
- A start-up suffers from limited resources. The creative minds of the engineers and the new opportunities arising almost daily are a dangerous combination. The ability to prioritize the opportunities and focus in terms of strategy, products and markets is crucial for success.

Management has to lead the focusing efforts; a sound and experienced marketing staff is required from the outset; and the smooth communication between marketing and R&D is critical. For companies isolated from their main markets, such as Israel, there is a clear tendency to ignore customer's needs. Marketing assisted by top management should devote a major effort to involve potential customers at an early stage of the start-up activity. Along the same lines start-ups should seek cooperation with customers and/or major companies in the industry and the market. Although strategic partnerships with giant companies are difficult and dangerous because of imbalance of power, tactical cooperations should be exhausted. Focusing in a fast moving world is perilous, since markets might change their direction and needs, but a lack of focus in a situation of limited resources entails a much higher risk. Deficiency in certain areas can be overcome by using consultants and sometimes the investors. Investors are viewed as potentially useful in fields such as marketing, finance and technology. Consultants can be replaced according to the changing needs of the company

- Lack of resources often prevents the company from developing a complete solution. In this case leveraging the strengths of others could be an optimal solution. Selling to OEMs which integrate the start-up product and/or using their networking in marketing and sales can be very beneficial. Check point, one of the Israeli biggest successes in the last decade utilized Sun computers as an OEM for their Firewall product and rapidly achieved market leadership.
- There is some contradiction in the literature regarding the necessity to being "first in the market". Although Cooper (1979) doesn't attach advantage to this strategy, it could sometimes be the main advantage of a start-up. First in the market appearance while avoiding introduction of new industry standards can be rewarding. Optimizing a product while delaying the product launch can be a costly mistake since competitors might appear and gain "the first in the market" advantage. The market growth is also a source of debate among scholars and the research results prove that sizeable and highly growing markets can attract large competitors; the study results agree with Christensen (1977) that a start-up should rather commence in a focused niche market which is not too alluring for the big players in the industry.
- The "rush for gold" period is over and start-ups should build a solid and sound company based on products with real market needs and not on the "gut feelings" of the entrepreneurs. Start-ups should not rely on the low chance of luck to be acquired early, for technological reasons, by a big company.

- The clear lesson from recent years is: "Raise money when you can, not when you need" and "raise more than you need". The economy is fluctuating in unpredictable waves, changing availability of capital for investment in high-tech start-ups. Investors hesitate to invest when a company is in distress and if they decide so they will take full advantage of the situation. Entrepreneurs are optimistic by nature. In reality there are always more obstacles than expected, generating higher cost than foreseen for development and market penetration. A distinctive point in the Israeli situation is probably the relatively high availability of VC capital (more than any other country in terms of percentage of GDP). This might have skewed the importance level of funding to the low ranking it has received. It also strengthens the Israeli belief that entrepreneurs should not invest their personal money. The notion is that a high-tech entrepreneur invests enough in terms of opportunity costs and the outside money can serve as a sanity check that the enterprise idea and plan is sensible. In many other countries the investors include the investment of personal money in their sought assessment of the entrepreneur personal commitment level. Deloitte-Touche-Tohmatsu (2005) asserts that the biggest threat to growth in the technology sector, in the near future, appears to be limited access to capital.

Regarding the Israeli high-tech start-ups the author can add the following points for consideration:

- Israeli companies in general and high-tech start-up in particular lack management skills and experience. One of the areas in which this phenomenon is critical is the international marketing. Interestingly, Deloitte-Touche-Tohmatsu (2005) in their mostly European (including Israel) survey maintain that the biggest challenge in managing high-tech companies in 2004 was developing a strong sales and marketing strategy.
- The tendency to focus on the US market, usually because of networking or familiarity reasons is not always warrant. Some of the large developing and growing markets such as China and India seek innovative solutions and provide better opportunities. Naturally prudence is necessary since these countries pose also a threat to any high-tech company.
- Venture Capital is relatively affluent but often there is a pressure to exercise quick results not always congruent with the start-up goals. The ventures should endeavor to find a good fit between the main investors and the company's ethos and goals.

- The team spirit originating from the strong influence of the military service and the relatively high availability of skilled and educated personal are no doubt factors assisting the success of Israeli high-tech start-ups.
- Although Israel is a small community and suffers from considerable security difficulties, it seems that the reputation of Israeli high-tech industry is quite established which helps to alleviate the perceived risk of buying products from Israel or cooperating with Israeli companies. The political environment and the security situation don't seem to play a major role in the success of Israeli ventures in the international arena. But political influence is often difficult to measure or even estimate. From all the external issues, the global economy seemed to be the most influential. Therefore entrepreneurs might plan the establishment of the companies when the market are prosperous and funds are available and seek to launch their products as early as possible before the economical circumstances change or the market shifts. Times of political stability and security tranquility can only facilitate the chances of market acceptance and success.

The author does not propose that the study represents an absolute picture of new venture performance since there are always variables which might have a powerful impact on start-up success which have been left out of this study by discretion or unintentionally. The author can suggest that the new model contains a comprehensive approach which could not be found in previous similar models. Although the model shows good reliability and validity some enhancement of the model could improve the level of details for easier practical use. The envisioned future model should have a multi dimensional matrix specifying the detailed description of the necessary elements in each topic and the desired level of achievement depending on variables such as the: different stages of the company life cycle, industry, geographic region and industry.

The research model of the factors for success is derived from the extensive experience of many of leading experts in the field. In consequence, it is soundly grounded in experience and knowledge and should have a very practical utility. The application of the model may enable new firms to identify and perform an assessment of their capacities and thus to change, modify, amend or to acquire required capabilities to improve success rate probabilities in a difficult environment. Whilst the model is based on the Israeli environment and experience, many other countries geographically isolated from their main markets share many of these characteristics, so the model may have a much greater general utility.

It is important to add a word of caution. The model requires somewhat difficult to attain objective judgments of the achieved level in the different factors. The analysis involves real time judgment which is not an easy task and is very different from analysis of past cases where the outcome is known. In order to perform a sound examination, a list of issues related to each of the topics and parameters (especially those who are deemed to be critical) has to be prepared. The start-up managers often immerse in daily activities and emotions, therefore it is recommended that the assessment will be executed by objective external consultants who are not involved emotionally but understand the specific high-tech sector and are experienced in start-up companies. Those consultants can overcome some of the obstacles by attaining assessment, and possibly consensus, from several decision makers involved within the firm.

6.2 The research limitations

- The relatively large sample of respondents is not big enough to create clusters differentiating between successful and successful start-ups in the different life stages. Such an effort could lead to a three dimensional model identifying clearly what separates between success and failure at their various life stages;
- More personal interviews could reveal some additional parameters and their relation to success and failure of the different start-ups;
- The economical situation which has a strong effect on availability of funds and the selected strategy by many of the start-ups can not be isolated;
- The personal effect of the entrepreneurs/CEO has sometimes a strong effect on many of the outcomes but was not a direct component of this study.

6.3 Recommendations for future Research

The suggested model is a general model and doesn't perform an insightful analysis of each of the subjects with its parameters.

It is recommended to continue with a research deeply analyzing each topic and its parameters. An important goal would be to attain a discriminant analysis, disclosing the main differences between successful and unsuccessful high-tech start-ups. This mission is not easy because respondents tend to answer according to their experience and knowledge and not according to the start-up behavior and the level it has implemented each of the subjects. To explore relationships between the different topics and connect the implementation to performance and success level there is a

need for a more detailed and thorough information. This can be achieved by in-depth interviews, case studies and personal questionnaires emphasizing the need to describe the start-up behavior in reality.

As underlined in many articles and quotes many Israeli (and maybe other) start-ups lack expertise in marketing and management. A research focusing on marketing as example could be very valuable to improve the misconception of many Technologists, who establish a start-up venture, about the role of marketing and will improve the construction and crucial performance of the marketing department.

Also exploration of the interrelations between the different subjects is a legitimate matter for research. This research slightly discussed the importance of proficient interaction between the marketing and R&D department but many other relationships could and should be discussed.

Some other subjects for interesting investigation are:

- The role of Politics (might be very industry and/or country dependent);
- The future role of VCs;
- The way the environment could assist the start-ups. (Would could the government do or improve in order to support the high-tech start-ups and lead to economical growth and independence).

A longitudinal study investigating the start-ups behavior and the change in focus on the different topics during different economical circumstance and at various points of the start-up life time can also reveal more intimately the effect of the topics during different stages and the effect of global economy and other circumstances on the start-ups success.

To summarize the author suggests that further research on large and broad samples assessing start-up companies in different environments, cultures and industries accompanied by necessary adaptation of the model could yield a comprehensive model that is appropriate for broader applicability. It is important to emphasize that although the model is based on a profound research and includes a validation process it has still to be tested; refined and expanded hence it provides ample opportunities for further research.

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Appendices

Appendix no. 1: The questionnaire pertaining to a business platform for the success of start-up companies (Translated from Hebrew)

This questionnaire is an integral part of a study on high-tech start-up companies in Israel. High-tech start-up ventures are a major building block in the prosperity of the State of Israel and its ability to attain economical independence.

Responding to this questionnaire will be of great assistance in conducting the research which is part of a doctoral dissertation on the relation of key personnel in the high-tech start-up community to different subjects. The objective is to construct a business model which will include all the building blocks required for successful start-up ventures. It will, at the same time, elaborate the key factors to be investigated in the initiation, establishment and operation of a start-up venture until it becomes a stable independent venture.

The questionnaire which you are asked to complete is a major tool to establish the model and is based on research papers in Israel and globally, and the involvement of key persons involved in the Israeli start-up industry.

If you are interested in receiving the research results I will be more than happy to mail them to you if you will kindly note your address at the end of the form.

Part A – General questions

1. Company name (option) _____
2. How many years does the start-up exist?
   ☐ Less than a year ☐ 1-2 ☐ 2-4 ☐ 4-8 ☐ over 8 years
3. Size of venture (number of employees):
   ☐ Less than 10 ☐ 10 – 19 ☐ 20 – 49 ☐ 50 – 99 ☐ Over 100
4. The start-up field (Industry): ☐ Communication ☐ Internet ☐ Computers
   ☐ Medicine ☐ Software ☐ Biotechnology ☐ Other (please specify) _____
5. How would you define the current stage of the venture?
   ☐Start of Product Development ☐ ß Site ☐ Beginning of Sales
   ☐ Rapid Growth ☐ Profitability ☐ Profitability and Growth ☐ Survivability
   ☐ Company shut down ☐ Other (please specify) _____
6. Does the company show operational profit?
   ☐ Yes ☐ No
7. Who are the main investors in the company? ☐ Holding Companies
   ☐ Private Israeli Investors ☐ Venture Capital ☐ Institutional Investors
   ☐ Foreign Investors ☐ RDC ☐ Other (Please Specify) _____
8. Is the source of the start-up technology in the Defense Industry?
   ☐ Yes ☐ No ☐ Partially (Please Specify) _____

9. How much funding has the venture raised so far ($ million)?
☐ Less than 1 ☐1-5 ☐ 5-15 ☐ 15-50 ☐ Over 50

10. How many rounds of funding has the venture done (up to date)?
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 or more

11. Do you consider the current (last) start-up as successful?
☐ Yes ☐ No

12. How do you measure success of a start-up (Please specify)?_____

Part B – Questions regarding the model parameters

The questions in this part of the questionnaire relate to the research model. You are requested to express your opinion on the importance of each subject to the success of start-up companies and the importance of each parameter in the subject (in each line mark an X in a square).
The subject title is presented first. You are then asked to rank the major parameters related to the subject and at the end of each paragraph to rank the subject itself.

Unimportant			Medium importance			Very great importance
1	2	3	4	5	6	7

A. The idea

A.1 The idea formulation and its level of clarity 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

A.2 The level that the idea meets real customer needs 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

A.3 The general idea **1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐**

B. The strategy

B.1 Mission statement 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

B.2 Venture industry analysis including future competitors and trends in the industry 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

B.3 Clear strategy from the start-up initiation phase 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

B.4 Continuous revisit and update of the strategy plan (while reviewing major parameters such as markets, technologies, customers, employee's motivation) 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

B.5 Is it important to establish a Start Up that will grow in the long run into an independent big company or is it better to develop a technology/product to attract acquisition by a big established company? ☐ Big Company in the long run ☐ An enterprise to be acquired ☐ It does not matter (both options are good)

B.6 Importance of the strategy in general **1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐**

C. Expertise of the core team (start-up leaders)

C.1 Diverse and multidisciplinary experience of the core team 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

C.2 Former experience in previous start-ups 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

C.3 Leadership capability of the core team 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

C.4 Using expert consultants at least in certain stages of the start-up (technology experts, marketing experts, etc…) 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

C.5 Investors contribution in main venture functions (management, finance, marketing etc…) 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

C.6 Expertise of the core team in general **1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐**

C.7 Where can the investors (VCs or angels) have a meaningful contribution to the start-up? Please specify: _____

D. Total commitment of the core team to the venture

D.1 Identification of the core team with the start-up goals 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

D.2 The motivation of the leading team 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

D.3 The total commitment of the core team in general **1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐**

E. Organization (Structure) of the Venture

E.1 Clear definition of employee domains of responsibility 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

E.2 A structure of few organization levels 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

E.3 Is it preferred to have a formal or non formal venture organization? ☐ formal ☐ non formal

E.4 **Importance of the Organization in general** 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

F. Market orientation and marketing strategy

F.1 A comprehensive acquaintance with the market 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

F.2 A reliable marketing plan based on solid market information 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

F.3 Implementation of market research 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

F.4 Assessment of the expected growth and profits in the selected market (internal expansion, providing additional products, penetrating neighboring segments/niches) 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

F.5 Establishing new markets while defining new standards 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

F.6 Organization to penetrate international markets (proper staffing and geographic distribution) 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

F.7 Permanent market follow-up and proper organization to deal with market dynamics 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

F.8 Patent registration for the product(s) 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

F.9 Product perceived utility (product importance for the customer) 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

F.10 Developing and supporting distribution channels already in the R&D phase 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

F.11 Product positioning 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

F.12 Reciprocal relations between marketing and R&D departments 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

F.13 Early recognition of the main market and planning of main market penetration (planning early strategy, complete solution and raising funds to penetrate the main market)
1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

F.14 What is the preferable strategy for a start-up, to develop a product for a wide market or focusing on a well defined niche market? ☐ Product for the wide market ☐ Focusing on a niche market

F.15 Is the preferable that the leading marketing team will be located in Israel or overseas?
☐ In Israel ☐ Overseas in one center ☐ Overseas in each main market

F.16 Is the preferable that the leading marketing team will be Israeli, foreigners or a mix of both?
☐ Israelis ☐ Foreigners ☐ A mix of Israelis and Foreigners ☐ Doesn't matter

F.17 Importance of Market Orientation and Strategy 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

G. Personal relationships with customers

G.1 Personal acquaintance of the customer and his needs 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

G.2 Understanding the customer's buying behavior 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

G.3 Implementation of customers' feedback 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

G.4 Market receptivity (readiness to absorb the products) 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

G.5 Opportunities for continual sales (Creation of a captive market) 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

G.6 Personal relationship with customers in general 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

H. Management

H.1 Management style (autocratic, democratic, laissez faire) 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

H.2 Team solidarity within the enterprise 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

H.3 Development of employee teams 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

H.4 Venture management in general 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

I. Networking

I.1 In which domains is it important to have good networking with people who can assist the Start Up?
☐ Finance ☐ Management ☐ Technology ☐ Law ☐ Marketing (local and overseas)

I.2 Are there any additional aspects with whom it is important for the Start-up to have strong networking? (please specify) _____

I.3 Networking importance in general 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

J. Capabilities in product development (R&D quality)

J.1 The skillful technological manpower in Israel 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

J.2 The technology stemming from the defense industry 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

J.3 Quality of R&D team to achieve the goals 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

J.4 Level of the product innovation 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

J.5 Technological breakthrough in the product 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

J.6 Simple to adapt to different needs in international markets 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

J.7 Quality/durability of the product 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

J.8 Product price 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

J.9 Initial product arriving quickly at the market 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
(as opposed to a better and more comprehensive product arriving later in the market)

J.10 Capabilities in product development in general 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

K. A "complete product" (a complete solution)

K.1 A product which is a device/gadget (not a complete product) 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

K.2 A complete and competitive solution (including ILS etc.) 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

K.3 R&D Cooperation to achieve a "Complete Product" 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

K.4 Marketing Cooperation to achieve a "Complete Product" 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

K.5 The importance of a "complete product/solution" 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

L. Type of funding (including the investors' role)

L.1 Which groups are important in your opinion in funding the start-up: ☐ Venture Capital ☐ Private Investors ☐ Friends/Family ☐ Other companies/Firms ☐ Government Support

L.2 Is it important to raise funds enabling to penetrate the main market (Crossing the Chasm, after penetration of the initial market) at an early stage of the venture? ☐ Yes, it is important ☐ No it is not important

L.3 Some argue that financing of a start-up has to be raised when possible and available and not when needed. Please provide your opinion to this: _____

L.4 The importance of the type of funding in general 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

External (to the venture) Factors

M. Political Situation

M.1 The political environment 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

M.2 The security situation in Israel 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

M.3 The political situation in general 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

N. General environment

N.1 The influence of the military service on the quality of Manpower 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

N.2 Education and training for entrepreneurship 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

N.3 Availability of skilled work force 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

N.4 Government policies and supporting programs 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

N.5 Social and cultural norms 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

N.6 Importance of the environment in general 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

O. Economical Situation

O.1 Global economy 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

O.2 Domestic economy 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

O.3 Availability of finance and other resources 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

O.4 The importance of the economy in general 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

Part C – Overall ranking

1. Please rank all the subjects into three groups. Group I – The most important subjects, Group II – Medium importance and Group III – the subjects of low importance (check the square).
   Important! Try to rank 4-6 subjects in each group. Each subject will be ranked only in one group.
   - First mark an X in the square (each subject in one square according to its importance)
   - After competing the ranking into groups please rank the subjects in each group (on the line near the marked square). The most important subject in the group will receive the mark 1, the second in importance – 2 and so on.

The subject	Group I Very important	Group II Medium importance	Group III Low importance
The idea	☐ _	☐ _	☐ _
The strategy	☐ _	☐ _	☐ _
Expertise of the core team	☐ _	☐ _	☐ _
Total commitment of the core team	☐ _	☐ _	☐ _
Organization of the start-up	☐ _	☐ _	☐ _
Market orientation and marketing strategy	☐ _	☐ _	☐ _
Human relationship with customers	☐ _	☐ _	☐ _
Management of the start-up	☐ _	☐ _	☐ _
Networking with external sources	☐ _	☐ _	☐ _
Capability in product development	☐ _	☐ _	☐ _
Complete product (a complete solution)	☐ _	☐ _	☐ _
Venture type of funding	☐ _	☐ _	☐ _
Political situation	☐ _	☐ _	☐ _
General environment	☐ _	☐ _	☐ _
Economical situation	☐ _	☐ _	☐ _

2. Successful start-up companies also have some weaknesses. How, in your opinion, can the achievements of the Israeli start-up companies be improved? (Try to rank according to importance)

1 _____
2 _____
3 _____
4 _____

3. What are the main reasons for the failure of Israeli start-ups? (for example, management, marketing, culture, product adaptability). Try to rank according to importance.

1 _____
2 _____
3 _____
4 _____

4. Please offer three suggestions which you would give from your own experience to Israeli start-up managers.

1 _____
2 _____
3 _____

5. How would you define a successful start-up at each of the following stages?

   a. A start-up existing up to two years which has at least:

   ☐ Raised funds for R&D ☐ Raised funds for R&D and marketing ☐ Is in the ß Site stage
   ☐ Started Sales ☐ Other (please specify) _____

   b. A start-up existing up existing between two and four years which has at least:

   ☐ ß Site stage ☐ Started Sales ☐ Sells according to the business plan
   ☐ Attained a strategic partner ☐ Has profits ☐ Survives ☐ Other (specify) _____

   c. A start-up existing up existing between four and eight years which has at least:

   ☐ Has Sales ☐ Sells according to the business plan ☐ High growth
   ☐ Profitability with growth ☐ Profitability ☐ Survives ☐ Other (specify) _____

   d. A start-up existing up existing more than eight years which has at least:

   ☐ Sells according to business plan ☐ Sells up to two years behind the business plan
   ☐ Profitability with growth ☐ Profitability ☐ Survives ☐ Other (specify) _____

6. Some people claim that success requires to lower R&D costs which can be achieved with outsourcing to countries with lower skilled manpower costs (East Europe, India, etc.). Do you agree with this notion? ☐ Agree ☐ Don't agree

Part D – Personal Details (complete only the details you wish)

1. Name and E - Mail (Optional) _____ E-Mail (Optional) _____

2. Is this the first high-tech start-up in which you are involved? ☐ Yes ☐ No

   If yes please skip the next question

3. With how many high-tech start-ups (including the current/last one) have you been involved? ☐ 2 ☐ 3 ☐ 4 or more

4. How many years are you involved in high-tech start-ups entrepreneurship?

   ☐ Less than a year ☐ 1-2 ☐ 2- 4 ☐ 4-8 ☐ Over 8 years

5. What is your current (was your last) position in the start-up?

   ☐ CEO/President ☐ VP Marketing/Bus. Dev. ☐ Marketing Manager
   ☐ VP R&D/Engineering or CTO ☐ CFO ☐ Other _____

6. Are you among the venture founders? ☐ Yes ☐ No

7. Education: ☐ High School ☐ Technician ☐ BA/BSc ☐ Master ☐ PhD/DBA

8. Education Field: ☐ Engineering ☐ Science ☐ Business ☐ Industrial Mgmt
   ☐ Economy ☐ Engineering and Business ☐ Other _____

9. Years in the venture: ☐ Less than 1 ☐ 1 – 2 ☐ 2 – 3 ☐ 3 – 5 ☐ Over 5

Appendix no. 2: Changes to the questionnaire

The original questionnaire was distributed to a number of people involved in current and past start-up mangers, VC managers and marketing consultants.

The major changes after the Pilot study were as follows:

- The introduction was abbreviated and the research purpose was emphasized;
- The business, business phase, major investors and the profitability domains were slightly updated. A question regarding the viewpoint of the responders regarding the success of the start-up was added;
- Many of the questions were rephrased for clarity and lack of ambiguity;
- Some parameters which seemed to be less influential were deleted in most subjects in order to shorten the very long questionnaire;
- New questions were added pertaining to the marketing and product aspects to understand the marketing strategy (focus) and to explore cooperation and profitability. Questions regarding the economic situation were similarly deleted;
- A question dealing with the definition of a successful start-up during its lifetime was added;
- Some investor's options were added;
- Three major open questions have been included. One deals with how to improve Israeli start-up performance, the second deals with the main reasons behind the failure of Israeli start-ups and the third is regarding the best advice one can offer from experience to new start-up ventures;
- The ordinal level of all questions was changed from 5 to 7 in order to enable better discrimination.

Appendix no. 3: Questionnaire - Reliability between the parameters for each topic (Cronbach α results)

	Topic	Parameters in questionnaire	Cronbach α	Note (*)
1	Importance of idea	a1 – a3	0.62	
2	Strategy importance	b1 – b4, b6	0.76	
3	Core team expertise importance	c1-c6	0.75	C2
4	Core team commitment importance	d1-d3	0.94	
5	Organization importance	e1, e2, e4	0.72	
6	Marketing strategy importance	f1-f13, f17	0.87	
7	Customer relation importance	g1-g6	0.86	
8	Management importance	h1-h4	0.87	
9	Networking importance	i3	--	
10	R&D importance	j1-j10	0.81	
11	Complete product importance	k1-k5	0.90	
12	Funding type importance	l3	--	
13	Politics importance	m1-m3	0.97	
14	General environment Importance	n1-n6	0.75	
15	Economy importance	o1-o4	0.88	

(*) Includes items omitted from the index in order to increase reliability

Appendix no. 4: Analysis of open questions

Part A

12. How do you measure success of a start-up (Please detail)?

Definition	Experts	start-ups
Development of products contributing to the company, its employees, and customers while realizing the vision and the business objectives	1	15
Perseverance towards growing sales while generating profits as early as possible		10
To pass all the basic stages such as fund raising, product development (including ß site) including survivability in lean years, in order to achieve profitability	1	5
Success in the market and profitability	1	5
Penetrating the market, successful absorption of the products in the market, growth, profitability and gaining leadership in the market niche		4
Reached substantial sales and is at break even point or profitable or has been purchased or "Exit" for a valuation exceeding its fund raising value		2
Creation of a product responding to real market needs and building a reputation in the market. (The desire should be minimum product assimilation efforts)		3
Technological capability enabling implementation of a profitable and needed product		7
Creation of sales while analyzing the future and risks		1
Early connection to leading companies as strategic partners		2
Positive cash flow achieving exit (with no crash)		4
Fast connection to customers, while creating sales in a defined market niche with clear technological benefit		1
High interest level from investors and customers (market potential)		3
Establishing a profitable long standing company or selling the company with high profits		1
Achieving the goals within the time schedule	3	5
Growth with financial strength	1	
Balanced team		1
Flexibility to implement needed changes	1	
Optimization of resources consumption	2	

Some of general definitions

- Identifying a genuine need in a defined market (niche), generating a unique solution, penetrating the market, achieving continuous growth

in sales to the targeted market, while increasing the market share until dominance and obtaining rising profitability;

- Continuous improvement of development pace, sales and value. Raising sufficient funds for the full scope, preventing survivability struggle and finally achieving significant profits to the investors and handsome compensation (value) for the employees (much above the traditional industry);
- A company which creates a continuous commercial value with a good growth potential, achieving financial equilibrium at a reasonable timeframe;
- Success at the first round of product development while maintaining high value for the investors. Establishing a strategic partnership based on a unique technology to satisfy a clear need while assuring an initial market niche

Part B

C6: Where can the investors (VCs or angels) have a meaningful contribution to the start-up?

Definition	Experts	start-ups
Follow-on investments (according to the start-up needs and requirements in its different stages)	3	30
Creating strategic/commercial cooperation and partnerships with investors, industry and customers and serving as door openers	4	28
Providing strategic direction and business advice	1	18
Recruitment of key personnel and creation of leadership	1	7
Supporting the management along its way and preventing friction		3
Early diagnosis of problems and implementation of prevention methods	1	
Management	1	3
Assisting in mature and organized operation		3
Not to intervene in the daily management		3

I.2 Are there any additional aspects with whom it is important for the start-up to have strong networking?

Definition	Experts	start-ups
Specialists in the industry (including companies)		5
Influential consultants (including from the academia)	1	2
Leading customers as potential strategic partners		4
Opinion leaders		2
Commercial attaches (in Embassies)		2

L.3 Some argue that financing a start-up should be raised when possible and available and not when needed. Please note your opinion to this.

Definition	Experts	start-ups
When needed	1	5
When possible and available **General comments** ▪ More than you expect you need ▪ Enables to change course in today's dynamic fast changing market ▪ Commercial processes are difficult to predict and require resources ▪ Alleviate unpredictable obstacles emanating from political, economical and stock market crises.	7	36

Part C

2. Successful start-up companies also have some weaknesses. What do the start-ups need in order to improve their performance?

Definition	Experts	start-ups
Skilled professional management. (Very often poor balance between marketing and R&D management, with too much technological focus)	4	21
Democratic but decisive CEO		1
Leadership	1	1
Credibility		1
Less arrogance and exaggerated self confidence	2	1
More patience	1	
Tolerance for errors		2
Core team - developed, experienced, professional and committed	1	8

Definition	Experts	start-ups
Workforce - experienced and versatile	1	5
Clear task definition		1
Be more attentive to experienced people to gain knowledge, but to take decision at home	1	
Better organizational culture and personal relationship		5
Improve strategic myopia (or not crystallized strategy) and lack of strategy update	1	9
Improve marketing strategy drawbacks: • Lack of understanding the market • Late marketing activity • Too small market niche • Lack of planning market expansion into new markets/products • No continuous update, according to market events	4	19
Improve marketing setup weaknesses • Late and/or bad construction • Insufficient investments in sales and distribution channels	1	18
Marketing focus	1	5
Find ways to overcome cultural differences which are related to distance from the market		3
Giving up opportunities not in the core business		1
Improve marketing and R&D communication		2
Receive feedback from customers		1
Avoid short cuts (improvisation mentality)		1
Find a strategic customer/partner for first product		1
Improving understanding of the customer's needs		2
Overcome poor adaptation of the product to the real market needs (focus on the product instead of needs and developing of a too smart product not meeting the marketing requirements)		11
Avoid Sales at any cost (even with bad quality)		1
Consider carefully product price strategy		1
Poor R&D control	1	1
Technology not mature	1	1
Low level of innovation		1
Poor product quality and lack of a full product (packaging, integrated logistic support)		9
Investment in R&D infrastructure too low (bad assessment of R&D costs)		2
Not qualitative writing of patents		1
Bad selection of strategic partners	1	2
Bad selection of investors (intervene and interfere)		5
Lack of a strategic partner investor		2
Connection to and assistance from investors		1

Definition	Experts	start-ups
Additional connections (commercial attaches)		2
Insufficient funds (poor assessments of needs, costs, funding for crisis periods)	2	11
Raising funds on time (preventing decision making under pressure)		1
Remember the element of luck	1	
Improve learning capability	1	
Development of analysis tools to improve the long term assessments (prediction)	1	
It is a marathon (be patient)		1
Megalomania and waste of money		3
Utilize experts, learn from them, utilize external knowledge and be modest		3

3. What are the main reasons for the failure of Israeli start-ups (for example, management, marketing, culture, product adaptability)?

Definition	Experts	start-ups
Skilled professional management. (Very often poor balance between marketing and R&D management, with too much technological focus)	6	28
Unsuitable CEO		2
Arrogance and exaggerated self confidence	2	1
Developed, experienced, professional core team		11
Core team commitment		3
Megalomania and waste of resources		2
Deficient involvement of the board and poor coordination with the investors	1	1
Preservation of the enthusiasm		1
Strategic myopia (or not crystallized strategy) and lack of strategy update	3	4
Mind fixation (inability to make necessary changes)		1
Marketing strategy and marketing setup • Lack of understanding the market; • Late marketing activity; • Too small market niche; • Lack of planning market expansion into new markets/products; • No continuous update, according to market events; • Late and/or bad construction.	6	32
Insufficient investments in sales and distribution channels		2
Poor after sale contacts connection to customers		2
Distance from the market and cultural differences	1	6
Listening and understanding customer's needs for product definition and implementation of customer's feedback	1	8
Finding a strategic customer/partner for first product		1
Adaptation of the product to the real market needs (focus on the product instead of needs and developing of a too smart product not meeting the marketing requirements)		15
No focus (while not giving up opportunities which are not in the core business)		4
Deficient R&D, resulting in long development and lack of preciseness in small details	2	6
Technology	1	7
Investment in R&D infrastructure (bad assessment of R&D costs)		1

Definition	Experts	start-ups
Bad assessment of R&D efforts	1	
Product quality and full product (packaging, integrated logistic support)		3
Product price		1
Product positioning		1
Improve learning capability	1	
Insufficient funds (poor assessments of needs, costs, funding for crisis periods)	1	11
Bad choice of investors (impatient)		3
Preservation of the enthusiasm		1
Utilize experts and learn from them		1
Political situation		1
Economical situation		1
Remember the element of luck		1

4. Please offer three pieces of advice which you would give from your own experience to Israeli start-up managers

Definition	Experts	start-ups
Management experience (focus on management and marketing and not on technology)	1	3
A courageous decision making system including continuous scrutiny of the business plan, the results and the implementation of change according to needs (including drastic changes like changes in the top management	1	7
Realistic and not optimistic planning	1	2
Foster a professional, experienced, harmonious and committed core team with good interpersonal relations.	1	18
Don't compromise on the work force quality and integrate the team (experienced and versatile workforce is crucial)	1	3
Navigate (be brave, but also consistent and organized)		3
Be modest (reduce the ego, arrogance and greediness)	1	4
Don't count your chickens before they are hatched, and don't be complacent	1	1
Behave deliberately	1	
Consult and listen to gain knowledge and experience, (don't be afraid to participate others and to tell your story) and select high level consultants.		8
Perseverance (do not despair, leadership and belief in the organization)	1	5
Define strategic direction	1	
Create a sound marketing strategy based on thorough investigation and knowledge of the market	1	19

Definition	Experts	start-ups
Investment in marketing including sales and distribution channels		3
Foster a strong marketing team		3
Have a confined, well-defined and focused market niche	1	4
Strive for cooperation with customers and/or leading companies at an early as possible stage (but select them carefully)	2	8
Be close and attentive to customers and produce initiatives accordingly.		4
Focus, focus, focus (on markets and products)		6
Think always ahead (beyond the short horizon). Plan for next markets/products		2
Company and product positioning		3
Product quality		1
Qualitative R&D management in order to achieve early time to market		2
Strong and fruitful connection between R&D and marketing (very often based overseas)		1
Good technology	1	
Financial management		4
Do not be tempted to develop the "perfect" product (it is costly, time wasting very often even missing the market needs in terms of features or price)		2
Sufficient funding and on time (from suitable sources) is essential	3	14
Do not be disturbed by dilution		1
Find investor(s) as strategic partner with added value		6

General remarks

The responses to some questions emphasize the occasional difficulty in giving a clear answer. Some examples of this are:

1. Developing a product for a focused (niche) market or a wide market depends on the strategy. Is it an OEM product which could be integrated in wide-market systems of big companies or a stand-alone complete solution? There is general agreement that focusing is very important if it is a stand alone solution. Even as an OEM product one should focus on his solution/product.
2. The location of the marketing team depends on the product, market and marketing strategy. Even though it is very prominent since the Israeli high-tech is based on penetrating foreign (remote) markets, involvement of foreign marketers who know and understand the customer culture and the market is almost always extremely important.
3. The issue of a "complete product" was probably not fully understood by all the respondents.

Appendix no. 5: Interviews (mini case studies) with Start-Ups

1. Vanguard

The idea behind the start-up was secure communication management of e-mail channels by smart management and encryption of the information. This includes different layers: The external world - Internet, the incoming data flow via the company gate and the internal (within the company) communication. The start-up was established in 1999, raised $5.5 million in three rounds and was closed late 2001 when investors decided not to invest in a new round of funding.

Analysis

Core tam

- The CEO was not familiar enough with the management of high-tech start-ups and did not have leadership qualifications;
- There was bad synergy between the leading team. The first VP for R&D (one of the founders) was replaced after the poor results of the alpha site which collapsed and the second one did not match well although his technological expertise was adequate;
- There was no harmony among the top management and some did not show too much credibility, commitment or loyalty.

Funding

- The burn rate of the funds was very high. The economical boom forced very high salaries and unnecessary expenditure on luxury and employees benefits;
- The new round of raising money was delayed to avoid dilution of stocks, and when it was unavoidable the economical exploded making it impossible.

Marketing

- The CEO viewed the US as the main market and opened offices there. The VP for marketing and his team focused on Europe. There was a power game to focus the efforts;
- The US office with its staff was very costly and did not show expected results;
- The market is also attractive for the big players, which means that once the product would be successful fierce competition could be expected;
- The product is a new concept intended primarily for big organizations and requires market education which is difficult in large organizations.

Product
The product started its beta site too early. The implementations for big organization caused many faults; they lost patience and discontinued the use of the product.

2. Netzer Precision Sensors
The idea behind the start-up was the manufacture of precision sensors for the machinery industry.

The start-up was established in 1996, has raised about $4 million in three rounds and started some sales. It is still not profitable. A member of one of the major investors' teams, which owns his own company producing complementary products, decided about a year ago, beginning of 2003, to chair the company and take advantage of the synergy (primarily in marketing channels) between the two companies.

Analysis

Core team
- The CEO was not good enough to lead the company into real growth and profits. The new CEO is more experienced and knows the industry (from his other business);
- The CEO did not generate a clear strategy;
- The core team has to be complementary but sometimes, because of differences, there are some chemistry difficulties among the team members;
- Egocentric behavior is a common problem;
- It is very important to filter the employees, primarily in key positions.

Marketing
- Marketing was not considered a major problem. The notion was that superior technology will attract customers;
- During initial marketing efforts it was found that the market has a different standard and only big companies might buy into the new standard offered by Netzer Precision tools as OEMs. But this type of projects takes long time which is tough for a young start-up striving for sales and profits;
- There was no serious market research and the founder does not feel he needs one;
- There are enough distributors but some of them are not familiar with the technology which hinders them in selling effectively the products.

Funding

- Funding is a critical issue primarily in view of the not-always foreseeable ups and downs of the economy. Is therefore important to raise funds when possible and not when needed.

Investors

- The investors are very important. They can slow down and even cause a great deal of harm to the company;
- It is important to select investors with understanding of the technology and clear added value. One of the important contributions of good investors could be good contacts in the target markets.

Product

- The belief was that new technology will buy the customer. The problem is that this is a traditional industry that is not changing products so rapidly and is reluctant to move quickly into different standards as Netzer Precision offered;
- One of the major flaws was that the products did not perform to the satisfaction of some initial customers. The product has to perform very well before being submitted to a big customer.

3. "AOIS" - Sales over the Internet

The AOIS enterprise was established in order to develop the technology and software to be used by "sales over the internet" companies. The company has reached a strategic agreement with one of the main players in the sales over the internet market and worked with some smaller companies in this area as well.

When the strategic partner decided to raise funds from the investors the market was hot and the company tried to reach a higher value before receiving the funds. A few months later the market collapsed, the strategic partner was not able to raise new funds and was divested.

The whole market almost disappeared and very few companies barely survived. AOIS went out of business.

Analysis

Giora, VP of the company, asserts that Israeli enterprises lack comprehension of the market and the penetration strategy. Most of the energy and attention should be diverted to the business development and marketing, to understanding the market, the customers' needs and attracting the right partners.

As an example analyzing the communication market, which is a concentrated market with few big players, one needs a strategic partner with a good access to the market players.

The second main issue is finance: Usually when there is a real need of money the investors feel the stress and are hesitant to invest or take advantage of the situation. They will downgrade the value of the enterprise as much as possible. Even in times of prosperity it is advisable not to wait (times change very quickly and unexpectedly) and raise funds before they are really needed.

The third main issue is time to market. The tendency of the Israeli high-tech industry is to bring to the market the most sophisticated product. The belief is that this will appeal to the buyers/customers.

The result is often being late in the market. The market is very dynamic, needs change quickly and competitors might appear every day. The product should be good and durable but can be simple. Entering the market is not inevitably with the most sophisticated product.

Precedence in the market often enables dictating the industry (or niche) standards, creating a big advantage by setting an entry barrier for new competitors.

Most of the high-tech start-ups are supported by VC. A major element in this structure is striving for quick results. The intention is not for long horizon planning and strategy but quick results which will yield profitable acquisition by a big player or public issuance of stocks.

4. "Starling" – Software for mass storage

Starling was based in Tefen – in northern Israel. The company developed software for mass storage companies. It was acquired by a major US company and the technology was assimilated in the company.

Analysis

Moshe was a VP in the company and the following are his observations about critical factors defining the destiny of a high-tech start-up:

Define the company goal: Strategic partnership, cooperation, independence.

Strategy: Where is the industry going?

Business structure

- The R&D should take advantage of the educated, multi-disciplined and sophisticated manpower in Israel;
- The marketing and sales should be located in the target markets.

The team

- CTO – the CTO plays a crucial role in identifying the future technologies creating the advantage and identifying the technological cooperation;
- Business development also plays a critical role which should create a business opportunity.

Cultural gaps

- Friendship – The Israeli culture to relate to new acquaintances as buddies is not customary in most cultures. In the US it would be regarded as an invasion of privacy;
- In the US the analogy is from the sport world – you pass the ball, you behave positively, optimistically and use superlatives. There are no buddies who share responsibilities.

The new world

- The new virtual world enables performing many functions, such as R&D in several locations which might be remotely located;
- International cooperation is vital.

Marketing

- "Domain specific expert" as a consultant. Most start-ups are not experts for their target market. This is very true for the Israeli high-tech markets which are geographically, mentally and culturally very remote from their destination. They need to hire an expert at a very early stage of the start-up existence in order to analyze the market characteristics such as size and growth potential, the competition and competitors and distribution channels, prices and costs;
- The same, or another, domain expert should find and mark the targets (niche markets). The business development and marketing team will navigate to the designated targets and capture them;
- Assess the window of opportunity in terms of time.

Management

- The Chief Executive should be replaced in time. The leading position which usually starts with a technology-driven person, who is one of the founders of the new venture, should be replaced with a market driven person.

Product

- Do not target for a big complicated product; until you reach the market, it might be too late.

Horizon

- Construct as a plan and a road map with three horizons: Short – the end of the year, medium – two to three years, long – the vision for 5-10 years.

The future

- Utility business: Buy a service not the product. Do not need the whole cow for a cup of milk. The future is towards paying for the consumption when needed. If one needs to use specific software for a few hours a month it will probably be more cost effective to pay when it is utilized instead of buying the software which might be outdated in one or two years. Somebody must provide the service and structure it in a way that many users can use the service when it is needed.

5. "iScraper" – Building construction utilizing the Internet

iScraper was established in order to provide big construction projects with a convenient platform over the internet which should assist in the design, planning and coordination of the project.

The entrepreneurs were able to secure agreements with a few big projects in Israel before they officially established the venture and raised VC funds. The funds were intended to complete the design of a sophisticated platform and for global marketing.

Soon after establishment a VP for marketing was hired and six offices around the world were launched. The CEO was a US citizen who spent most of his time in flights around the globe. The R&D remained in Israel. In 2001 shortly after the NASDAQ crash, the funds (of $14 million) were almost consumed, there was still no profit (annual sales were about $1 million while the burn rate was about $3 million), competition had emerged in many places and consolidation has already started. The investors have decided not to inject additional funds and to sell the technology and the customers.

Analysis

Schaul, one of the founders of the company assesses the main reasons for failure.

- Core team: The core team was not crystallized and did not act as one harmonized unit. Leading figures that were hired such as the CEO and the VP for marketing were not skilled enough for their missions. There were many managerial problems. Some of the leaders (such as the two founders) were very young and inexperienced;
- The Board of Directors, including the VCs representatives, was not professional and their contribution was very minor;
- The product (service): There is a real need for this kind of service but success is based on solid marketing strategy and effective penetration. The technological barriers for entry are not big;
- Marketing: There is a clear market for this service but the marketing strategy was not clear and the right customers were not identified. The exposure of the service in exhibitions and seminars enabled competition to surface and attract the paramount customers.

6 "Exect" – IP mediation

Exect was established in 1997 involving a technology collecting information regarding operations on data networks for billing purposes. Till its establishment the competition was based only on voice data (collecting information from switches). The model was based on understanding that the Internet providers will have to differentiate prices on base of discriminators such as transferred volume and content.

The R&D center was established in Israel and marketing staff was located in California. The first version was in the market a year after conception, and the start was very promising with good employees, leading technology, a concrete reputation, becoming a known brand in the billing industry and having plenty of cash.

Exect the raised $87 million in funds and was sold at the end of 2003 to a major billing company (Amdox) for a very low price ($29 million). Experts say that management and board of directors made too many mistakes.

Analysis

The assessments for the main reasons for failure are:

- CEO: is not familiar with the market. He sends his domestic sales people to handle a deal with a major European operator (naturally a main competitor won the deal). The operator mentioned that he preferred the technology of Exect. The CEO has to know the business, understand how he can solve the customer's critical problems and adapt the product/service to the customer's needs;
- Marketing: Utilizing US marketers in the European and Far East markets. Shifting the focus to the attractive market (from Internet to cellular communications) took too long;
- Sales: Direct sales (instead of distributors) increased costs very considerably. There was no filtering of opportunities which also increased the burn rate and prevented focus;
- The great distance between the product managers (in the US) and the R&D center (in Israel): The information flowing from the markets did not always receive proper R&D attention;
- Finance: There was much expenditure which could have been saved such as business class flights and costly vacations;
- R&D: At a certain stage another R&D center was established in the US. There was too much friction and not enough coordination;
- Products: Many products were developed in parallel loosing focus and wasting time on market segments not within the core business. The company had also the need to hire many employees to maintain all the products, again increasing cost. The large variety of products also made the sales peoples' role more difficult, less focused and less proficient;
- Complete product: Exect started with an IP mediation system (as part of a billing system) and approached the market with the billing companies. When the company elected to provide a complete billing solution it competed against the big companies and damaged the relations it had with the big billing organizations which had selected Exect as their complementary solution;
- Board of Directors: The board contains "seemingly" professional people from the VCs and other experts. It seems that if Exect has made many mistakes, the board failed in guiding its management and constructing the company strategy.

7. "Celletra" – Active cellular antennae

Celletra is a relatively mature start-up, established by two people in their 50's with an intensive technological background.

The idea is to improve the architecture of cellular transmissions, mainly by providing smart active antennas for the base stations of the cellular communications and achieving lower-cost hardware and higher effectiveness of the frequency spectrum.

Celletra aims to increase the efficiency of CDMA cellular networks and the third generation of cellular communication.
The business concept shows two main marketing alternatives:

- The network providers (big companies like: Ericsson, Siemens, Nokia);
- Service providers

The story

The company was established in 1997 and has built a diversified and experienced team but with no marketing department. The team included the co-partner of the CEO as the VP R&D, a chief scientist, VP Operations and a CFO. The CEO who is familiar with the main players in the industry (the network suppliers) also took on the role of marketing.

At the end of the 90s marketing VPs in Israel and the US were nominated but replaced frequently since they could not deliver quick sales.

There was no market research and the CEO drew up the business plan according to his knowledge and impressions. Since there was no focus on the target customers the R&D developed a series of product (with the same technology) and no leading product was concluded with all the necessary services (test equipment, Software, training manuals, etc.)

The start was quite promising; it included a good agreement with a Korean company pretending to penetrate the US market and several tests with leading US operators.

But things took longer then expected and Celletra lacked a mature product when the chasm of 21st century arrived. The agreement with the Korean company was terminated after two years as were some tests since the company was unable to penetrate the US market. Many operators disappeared between 2001-2003, some were divested and some were

acquired by larger operators which became much more conservative in their new equipment procurement strategy.

The third generation was delayed and the network companies suspended big R&D investments while providers put on hold expansion of their networks. Prices of hardware dropped by 50-70%.

The market is shifting with some emerging opportunities in the Far East. The CEO was replaced in 2002 and a senior marketing person was hired. The focus began to be concentrated on developing markets while continuing the tests with a big US provider. R&D and production started to focus efforts on the "Repeater" which is a relatively simple product but is relatively cheap and has need in some markets.

The overall market for "Repeaters" is not huge and a US company dealing with such a product went out of business in 2002 after some years of insufficient but existing production and sales.

The company is shifting its focus from Active Smart Antennas as leading family of products to transmitting and antennae command systems.

The former CEO of Celletra, Dr. Joseph Shapira, describes the future of the market as having some question marks. Will the market continue working with the traditional network suppliers or will there be an openness to specialist companies like Celletra? He claims that the diversification in consumption and architecture will open new windows of opportunities. Cooperation and mergers will most probably stabilize this important player in the infrastructure market.

Analysis

Business Plan

- The business plan was prepared using the CEO's best knowledge and understanding.

Marketing

- There was no marketing research at any form or level;
- There was no VP marketing involved in all the initial stages of the start-up;
- There was never a clear marketing strategy. The marketing activity is on daily decisions;
- The key marketing personnel was changed frequently because of short-term expectations and no long-term planning.

Management

- The CEO is primarily technology driven;
- The CEO was replaced last year after five years of no results;
- The new CEO has a strong background in marketing.

Product

- The product includes a new concept derived from defense technology. The concept was not tested in the market, and while starting marketing many objection were discovered. The major objection by the network suppliers were due to the reason that RF components are a large part of their business but they do not feel they have enough added value to integrate Celletra's products in their comprehensive network solutions;
  The cellular providers objections are primarily due to:
  - Psychological reasons: The objections of the public to the installation of active antennas (which are much bigger than the standard passive antennas);
  - The dependency on the network providers and preference to have turnkey projects and not annoying the network provider.

8. "Galil Medical" – Moshe

Galil Medical deals with cryogenic technology to cool tumors during operations. Galil Medical is an RDC company based on military technology developed in Rafael. Informal activity started within Rafael in 1994 and the company was established as an RDC company in 1997.

The idea replaces existing technologies such as cooling with liquid nitrogen in which control is limited and hence generates more damage. The new technology uses existing forms and needles and saves complicated adaptation of new technology to existing infrastructure.

The penetration into the medical market requires a long time and hefty budget. A long track record is needed before the product/technology is adapted for the main market. The physicians who have to "push" the product have mixed interests and sometimes prefer to promote a different solution. In the US some insurance agencies already approve and participate in payment when using this kind of treatment while in Europe the customer has to pay by himself.

In the 21st. century the new CEO moved the main marketing activity to the US and other markets were afforded a low profile. Because of the difficulties in penetrating the main market, in 2002 Galil Medical linked its main business (prostrate treatment) with a big American company (a

competitor) in the market that used a different (radioactive) technology. For the new company, the Galil Medical solution will be complementary to the radioactive treatment. Galil became primarily the production facility of the new (Onkura) company. Galil is trying to penetrate new areas of treatment but does not have any new product lines.

Analysis

Business plan

- The business plan is updated according to market events.

Marketing

- The market is quite big but saturated with direct and indirect competitors;
- The target market, the physicians, is a very complex market with contradicting interests;
- Penetrating the medical market requires long time, and high budgets;
- There is a need for several years of penetration until a new treatment is approved and adapted to the main market;
- Treatments might be too expensive for many people in the target market;
- The machine is purchased. The business concept was changed so profits can be made from the disposables consumed during treatment;
- The US sales are based on regional representatives while European sales are based on distributors.

Management

- The management was not very cooperative nor was it very coordinated;
- The CEO was replaced two years ago but the new CEO enacted some radical changes causing leading core employees to leave the company.

Product

- The product was found as effective in some cases but less effective for other types of tumor;
- The solution was not a complete solution but complementary to partially existing infrastructure;
- The product required long and expensive investments before receiving recognition and approval to be used in the main market.

The moral

- Penetrating the market with a product which takes long until maturity is strenuous;
- Cooperation in the medical field with major players is crucial;

- The start-up has to provide a complementary product focusing on R&D rather than on marketing and sales which should be performed by the partner.

9. "Voice Diary" – Digital voice diary for the blind

"Voice Diary" was established by William who worked for many years in Rafael, a big defense organization. When he received the opportunity for an early retirement he started to develop his new idea utilizing the opportunity to use Rafael facilities. William continues his activities as an entrepreneur till today, utilizing the same market niche with new products and different business configurations.

The story

The company was established in 1994 when William found an investor who invested $50,000 in the start-up. The business plan was created as a final project of MBA students and a patent was registered at the same time.

William identified the growing need of the blind population to have some means to communicate with the world and control their diary. The world is becoming ever more visual and the voice media is becoming less important. The big companies are reluctant to invest in voice technology especially not with tools and gadgets connected to the limited market of the blind population which comprises about 0.3% of the population (about 50,000 people). Here is a business niche for a small start-up. The company has received financing from the Chief Scientist who provided about 60% of the total investment of about $350,000.

The burgeoning economy beginning in 1998 and new start-ups with potentially huge markets attracted the investors' funds and skilled personnel, and it was difficult to obtain more funds for a limited market potential. William was replaced in 1998 by the main investor who decided to debut the market later with a more sophisticated tool.

Thereafter William founded a new company named Voila which is providing special stickers which can be scanned and stored with identification and notes in an handheld pen. During 2003 the company started to suffer from lack of funds and William sold his share to his partners who are the company's investors. The company is surviving, making some sales with limited profits.

In 2004 he started a new project - a talking diary for the blind. This time he joined an established company while deciding to be the entrepreneur, who provides the idea, and the marketing leader (after being experienced in the market) but not to be involved in the R&D and production. The product is a modern expansion of the voice diary, switching from the limited keyboard of the voice diary to an alpha-numeric keyboard and a thin and light weight device.

Analysis

The business plan

- The business plan was not bad for the start but was never updated or elaborated.

Marketing

- The only marketing analysis was that of the initial business plan;
- There were no funds to attract professional marketers;
- Because of the limited market the focus was on relevant seminars, exhibitions and distributors. This was done by William as CEO and the investor.

Management and team

- The Chief Executive was the founder of the company;
- The key personal were not professional (software leader);
- The team was not coherent and the investor decided to replace the CEO after his other investments completely failed.

Product

- There is a need for the product in the market but the market is limited in size and budget. Many of the blind population cannot afford to spend money on gadgets;
- There was no consideration of adaptation to a larger market.

Cooperation

- There are frequently attempts to cooperate with a big company (in this case Motorola) and use one's existing technology resulting in abuse without any real compensation or benefit to one's company .

Results

- William left the company which is still selling a new version of the voice diary. By 1998 it was able to cover its costs by selling several thousand diaries with revenues of about $500,000. The company seems to continue selling the equipment with some profits.

The entrepreneur (William) moral

- Sometimes it is smart to give up territory not to be responsible for the whole enterprise, and control and focus on one's capabilities;

- New immigrants to Israel are much more entrepreneurs because of their need for survival in the Diaspora than the Israeli Sabras (native Israelis) who grew in a bureaucratic social state;
- William is not rich but the blind, through his vision of assisting them, have benefited from his activities and are already served by three effective devices.

10. Quickturn Systems

Quickturn Systems was a Silicon Valley Start-Up dealing with the problem of electronic systems design verification by emulation. The company created a new niche in the industry of automatic testing and verification until it was acquired and swallowed by a big player in the industry. During its existence, the company had ups and downs, the CEO was replaced and the products were redesigned.

Main lessons of Zafar, a key figure

- CEO defines the culture of the company by his actions and conduct;
- Clear strategic direction and focused execution
- Customer forces and market dynamics should drive strategic thinking inside the company;
- Doubt and uncertainty are overcome by resilience and focus;
- Team compatibility is essential;
- Quality of team should not damage the paramount harmony of the team;
- Customer service is a key success factor.

Why Silicon Valley works?

- Culture respect for heroes and fallen knights;
- Access to capital and experienced consultants (in many areas of expertise);
- Access to talent pool.

Appendix no. 6: Interviews with Investors (VCs and Angels)

The interview

The idea behind the interviews was to find if there are any additional or different factors that were not discovered during the literature survey. The main points guiding the interview were:

- What are the main features determining the investment decision?
- What should be the involvement of the investors?
- In which area can the VC assist the start-up?
- The influence of external factors (economy, security) on the start-up's success?
- Comments about the suggested models (towards the end of the interview).

1. Eitan

Eitan is the most successful industrialist in Israel (in terms of profits and wealth). During the "Bubble" era he invested in numerous start-ups and he was asked about the factors for selecting ventures for investment.

General

- I was carried away by the hype;
- It was a bad decision to "gamble" in a field with no adequate background and expertise. One should focus on areas one commands. Business is not a casino;
- High-tech start-ups are motivated by new technologies. Israel can prosper by talent and innovation in other fields such as smart production.

Important factors for success

- Management, management, management;
- Return to the old known economical rules;
- Find a solution to real problems;
- Expertise and experience in the relevant industry branch

Factors driving failure

- The start-up is technology-driven and not market/solution driven;
- Trying to take short cuts instead of building a business step by step;
- Too many partners;
- Lack of chemistry among the partners;
- A lot of partners is as bad as brawling partners.

Venture Capital

- Greed (especially among the VCs);
- Non-professionalism among the investors;
- VCs are like insurance agents selling their "great plan".

2. Moti (at Walden)

General

- Walden Israel is a branch of the international Walden VC Company;
- Walden Israel is a VC specializing in early stage investment;
- Main problem at the early stage is a lack of reference about the start-up performance, weaknesses and strengths;
- The VCs are much more professional today (than during the "Bubble" period). They are a young industry in Israel (about 19 years) and constantly improving;
- During the "Bubble" one had only to forge ahead; there was no need for a real business model;
- Today due to caution following the "post- effect", funding is more gradual and frequently starts as limited pre-seed funding. Funding will sometimes be only for a feasibility study, marketing opportunities and chances;
- Funding milestones can be to find a design partner (a company with reputation) or a design win (granted by a reputable company) promising the incorporation of the start-up product in the big companies - a complete solution;
- VCs were not sufficiently professional to shut down futile start-ups in time, which is also part of the Israeli mentality of not giving up;
- The main improvement observed in recent years is in management and marketing.

Key factors for investment decisions

The expected value if successful

- Does the company have a good chance of executing a quick exit or being procured by a main player (big company)?
- What was the value of similar companies during their exit?

The competitive advantage

- A specific and robust advantage for success. What makes the difference creating the advantage that will lead to success?

The entrepreneur

- Can he lead the company to successful growth – (create something from nothing)?
- An entrepreneur with proven record is desired;
- Deep understanding and knowledge of the industry and the market;
- The most important skill is management and the ability to execute the plans.

The team

- Does the core team have the necessary skills and experience in critical areas, such as:
  - Management;
  - Technology;
  - Business development;
  - Marketing and sales;
- The lead team must be coherent. Any difference of opinion is hazardous.

The Venture Capitals

- The VCs play a major role on the Board of Directors;
- An international VC can utilize its international expertise and contacts/networking. The markets are global and an international VC can perform a good internationally viewed SWOT analysis while discovering the best global opportunities.

The Board

- The board must be capable in assisting the start-up in fields such as:
  - Supervision and control in terms such as operation, progress, finance;
  - Strategy formulation and update;
  - Consultancy in different areas;
  - Structure of the venture;
- The board needs at least one expert in the field;
- One of the difficulties is that the board comprises primarily the entrepreneur and the VCs representative (often lacking enough expertise) and not enough independent specialists;
- The board should not be involved in the daily management of the enterprise and only direct policy in general;
- In many cases it is advisable to have an advisory board (assisting the CEO).

The product and market

- Does the product provide a required solution?
- Is there a real competitive advantage?
- What is the time to market (the critical element in the hype era but now much less critical)?
- Will the product create big entry barriers (very important to deter immediate competition)?
- Identify an attractive market niche (big enough for good profits and growth but small enough for the big companies).

Other important assets

- A major asset is to find quickly a customer to create name recognition;
- Design partner or design win are very strong;
- Patents;
- Specific knowledge;
- Experience with customers.

Time to market

- Time to market is today much less crucial. (It is crucial when the market is hot – "Bubble" period).

The customer

- Is it clear there is a customer/s?
- Does/do the targeted customer/s has/ve the money to buy the product?

The business model

- What is the size of the market and the distribution channels?
- What are the models for cooperation (customers, VAR)?
- Is the product scalable? Capability for constant upgrades and repetitive sells to the customers. High probability of customer's loyalty. (Not always a full scale saga with existing customers).

Finance

- How much money will the venture require until exit? (This is much more relevant when the economy is down). This is more appropriate if heavy expenses are needed.

The customer

- Is it clear there is a customer/s?

Are the VCs impairing the economy?

- VCs have only business consideration. That is the only way to maximize returns.
- Profit is crucial for the VCs to raise new funds. Without new funds the VCs will lose their capability to mobilize the high-tech start-ups and hamper the economy;
- The drive for acquisition, often leading to transferring the business essence overseas, is driven only by economical reasons. The conflict between entrepreneur and VCs goes both ways. Very often the entrepreneur is the driver for quick acquisition (he has only one win-lose situation) and the VCs support waiting in order to grow, increase value and issue shares on the stock market.

External factors

- Globalization is assisting young ventures. Any company, even a small one, can enjoy effective outsourcing such as production outsourcing in the Far East.

3 Yair – Concord

General

- The VC is one of the most successful in Israel and has some big successes in companies such as Galilee;
- Israel is still recognized by US investors as second best (after the US itself) for high-tech start-ups investments.

Key factors for investment decisions

The entrepreneur

- Was neglected at the "Bubble" era;
- A long analysis of the entrepreneur (understand all his capabilities and aspects);
- The entrepreneur must be intimately familiar with the industry and market.

The team

- The synergy and mutual understanding of the team;
- Excellent team work.

The technology

- Unique technology which enables a gap of one to two years before competitors arrive. (This is different than US start-ups which do not necessarily seek technology but focus on execution). Software, for

example, does not enable big entry barriers and the key successful factors are all related to execution factors such as management and marketing;

- The start-ups are capable of opening a technological gap since the big companies invest only when the market arrives and when they identify an opportunity for a big market share in a big market. When the market arrives, they prefer to save R&D and shorten time to market by acquiring the technology from a start-up.

Market

- A key point is to know the market and industry;
- Timing - Try to analyze proper timing for a new product launch, especially important when there is a step in technology/breakthrough (too early is as bad as too late);
- Market analysis is done by discussion with potential customers;
- Regulated markets such as aviation are problematic (long processes, low level of innovation).

The Venture Capitals

- All the large high-tech companies developed in recent years started with funding of VCs;
- VCs need experts to understand the market and perform due diligence;
- The VC should strive for minimum involvement in the venture. It is not advisable for the VC to match experts to the start-up. The idea is to make profits and not to manage;
- The VC participates in the board, can assist in direction and provide some advice due to its experience, but the idea is minimum involvement;
- The notion that the VC wants quick acquisition is wrong. The idea is to maximize profits. If an IPO seems to be more valuable this way is supported. Concord has 11 successes (1 acquisition and 11 IPOs);
- Before acquisition the VC will again perform due diligence to the start-up.

Market dynamics

- Very often the start-up cannot achieve leadership but can be acquired in order for the buyer to achieve leadership. This point is very valid when there is consolidation in the market. Only the big companies survive but they seek strength by acquisition.

The product

- Technological superiority of the product;

- The product technology has to be a key success factor for the customer;
- High-tech in terms of consumer behavior: How the consumer utilizes the product/technology;
- A product which will require a constant technology upgrade (never become a commodity);
- A product binding the customer (to succeed in purchase).

Finance

- The finance required until exit should be between $5-30 million.

4 Reuven – Vectory

General

- The investment is multiplied many fold at each step of the start-up life. It is therefore important to make a careful decision at the outset and proper evaluation with experts who know the industry and understand the technology and the decision makers;
- There are failures that are very difficult to avoid. People do not always tell the truth at the research stage. Physicians will not tell you they will not support products which might monitor their activities and successes/failures;
- Trends are very important but difficult to analyze. This includes
    - Technological trends – Where is the technology going in few years?
    - Application trends - Who could estimate that SMS will become a powerful tool among the youngsters?
    - Budgets – Availability of budgets: Will there be budgets for the new technology/products?

Key factors for investment decisions

The culture

- Strategic alliances are very important because of the distance and the difference in culture and approach to business.

The society

- Includes many innovative people;
- The army qualifies many youngsters for high-tech activity and enhances the young generation creativity and improvisation capacity.

The technology

- Israel is no doubt among the leading countries in technology. It can serve as a very good Beta site to debug technical problems before performing a Beta on the customer's ground (facility). Arriving with a "clean" product prevents a "Lose face" phenomenon.

Market

- Israeli companies and products arrive in the market somewhat inferior due to the remoteness and to political reasons. They must thus excel in their technical performance.

Appendix no. 7: Summary of the interviews

Name	Galil	Celletra	Voice Diary
Status	**Operational**	**Operational**	**Operational**
Strategy	- Business plan frequently updated.		- Business plan not updated.
Core Team	- Not very harmonized.		- Not diversified nor experienced; - Not harmonized.
CEO	- Replaced but the new CEO enacted radical changes, causing retirement of leading personal.	- Decides about the strategy and makes the business plan; - Primarily technology driven; - New CEO (after 5 years) with strong marketing background.	- Not professional enough.
Others			- New immigrants can be a real diversifying force multiplier
Marketing	- Saturated market with direct and indirect competitors; - Long penetration time; - Distribution channels have different; construction in different geographical areas.	- No market research; - Unstable and operation restricted Marketing team; - No clear marketing Strategy.	- Only initial analysis with no update; - No funds allocated for professional staff; - Very limited market.
Product/ complete solution	- Might be expensive for large sectors of the target market; - Product strategy changed from product to disposables required for the usage; - Not suitable for all targeted market segments; -Needs authorities' approval.	- Based on OEM strategy while OEMs weren't convinced in the product's added value; - Big Psychological effects; - Refusal of potential customer to take; integration responsibility.	- There is a need; - No thinking of market expansion by product adaptation.
Customer Relations	- Complex customers with contradicting interests; - Is it clear there is a customer?		
Strategic alliance	- Very important for "complete solution" in the medical field.		- Have to be done very carefully, without loosing main assets.
Funding	- High penetration budget.		

Name	NetzSens	VanGuard	AOIS
Status	**Operational**	**Closed**	**Closed**
Strategy	- Not clear.		
Core team CEO Others	- No harmony; - Egocentric. - Lack of experience. - Control employee selection;	- No harmony; - Unsuitable.	
Marketing	- Based on superior technology • New standards in a conservative industry • Long diffusion period; • Lack of distribution channel support.	- Disagreement about main market.	
Product/ complete solution	- Performance troubles.	- No focus; - Too early introduction caused many faults.	- Seeking a perfect solution caused being late in the market.
Customer relations		- Education required.	
Funding Timing	- Difficult.	- Large waste. Too late to raise required funds.	- Became a major problem and prevented expected success. - Waiting too long to raise money
Investors	- Look for added value; - Can assist in marketing contacts.		- Seeking quick results.

Name	iScraper	Starling	Exect
Status	**Closed**	**Sold**	**Sold**
Strategy		- Define companies' goals; - Perform SWOT analysis; - Industry analysis; - The global world promotes; the distribution of functions; - Construct a plan with short medium and long range goals.	
Core Team CEO	- Formulation and harmonization.	- Should be replaced on time.	- Not familiar with the market.
Management	- Non-professional board of directors which includes many of the investors.		- Board of directors failed to guide and correct faults (which includes the VCs).
Marketing	- Marketing strategy is crucial for success.	- The leading team- located in target markets; - Business development staff has to identify the opportunities; - Utilize "field specific" experts (such as industry expert).	- Not done by locals who know the culture; - Have to provide tailored to needs solutions; - Direct sales are very often costly and unnecessary; - Wasting resources with not enough focus on clear segments.
Product/ Complete Solution	- High entry of barrier is important.	- Don't target a too sophisticated solution for market penetration. Time to market is important; - The future will lead to "utility consumption" not products.	- Several in parallel. No focus; - Decision for a complete solution annoyed the leading companies served before as OEMs.
Customer Relations		- Mind the cultural gaps, "Buddy" in business is Israeli behavior.	- Poor communication between R&D and marketing.
R&D		- Take advantages of highly skilled manpower in Israel.	- Friction between two R&D centers.
Strategic Alliance		- International corporations and alliances are crucial.	
Funding			- Unnecessary spending; - High costs because lack of; marketing/products focus.

Name	Quickturn	Eitan	Reuven
Status	**Sold**	**Angel**	**VC**
Strategy	- Clear strategy and focused execution; - Should be driven by customer forces and market dynamic; - Resilience and focus.	- Do not be carried away by the hype; - One should not "gamble" but focus in areas he commands.	- Trends are very important but difficult to analyze. This includes: Technological trends, application trends and availability of budgets for the new technology/products?
Core Team CEO Others	- High quality with team compatibility is decisive. - Defines the culture. - It is important to have easy access to high quality work force.	- Seek a team with expertise and experience in the industry.	
Management		-Good management is a key success factor; - Don't have too many partners. It makes it tougher to reach consensus.	
Marketing		- Find solutions to real needs; - Technology driven instead of market driven.	- Israeli companies and products arrive in the market with some inferiority, because of the remoteness and due to political reasons and. Therefore they have to excel in technical performance.
Product/ complete solution		- Prevent shortcuts in R&D and market.	- Israel is no doubt among the leading countries in technology. It can serve as a very good Beta site to debug technical problems.
Customer relations	- Customer needs good service.		
Strategic alliance			- Are very important because of the distance and the difference in culture and approach to business.
Funding	- Clusters like Silicon Valley can assist the funding.	- VCs were motivated by greediness; - Not too professional.	- Before investing VC should make a good expert evaluation and understand the technology and the decision makers.
External factors		- Forget the "New Economy".	- The Israeli society Includes many Innovative people; - The army qualifies many youngsters for high-tech activity and enhances the young generation creativity and improvisation capacity.

Name	Yair	Moti
Status	**VC**	**VC**
Core Team CEO	- Synergy and harmonization within the team. - A long analysis of the entrepreneur/CEO (understand all his capabilities and aspects); - The CEO/entrepreneur has to be intimately familiar with the industry and market.	- Do they have the necessary skills and experience in critical areas: o Management; o Technology; o Business Development; o Marketing and Sales; - Is the team coherent? - Can he lead the company to successful growth? - Does he have a proven record and deep understanding and knowledge of the industry and the market? - The most important skill is management and the ability to execute the plans.
Management		- The board must assist in: • Supervision and control strategy formulation and update; • Structure of the venture; - The board needs at least one expert in the industry; - The board lacks independent specialists; - The board should not be involved in the daily management of the enterprise; - Often it is advisable to have an advisory board (assisting the CEO).
Marketing	- A key point is to know the market and industry; - Very often the start-up can not achieve leadership but can be acquired in order of the buyer to achieve leadership.	- Identify an attractive market niche (big enough for good profits and growth but small enough for the big companies).
Product/ Complete Solution	- Unique technology which enables a gap of one to two years; - Timing: Try to analyze proper timing for new product launch, especially important when there is a step in technology/breakthrough; - Market analysis is done by discussion with potential customers; - Regulated markets are problematic; - High-tech in terms of consumer behavior/utilization; - A product which will require a constant technology upgrade; - A product binding the customer.	- Does the product provide a required solution? - Is there a real competitive advantage? - What is the time to market? (was critical element in the hype era). - Will the product create big entry barriers? - Is the product scalable? Capability for constant upgrades and repetitive sells to the customers.
Customer Relations		- Probability of customer's loyalty. (Not always a full dale saga with existing customers);

		- Is it clear there is a customer? - Does the targeted customer(s) has the money to buy the product?
Funding Amount	- The finance required until exit should be between 5 to 30 M$.	- VCs in Israel is a young field and today are much more professional and experienced; - Funding might be stepwise; - An international VC can utilize its international expertise and contacts/networking and perform a good internationally viewed SWOT analysis while discovering the best global opportunities; - VCs have only business consideration. That is the only way to maximize returns; - The drive for acquisition, often leading to transfer the business essence overseas is driven only by economical reasons. - How much money will the venture require until exit?
Investors	- The VC should strive for minimum involvement in the venture; - The VC participates in the board and can assist in direction and provide some advices due to its experience; - The notion that the VC wants quick acquisition is wrong; - The idea is maximizing profits.	
External Factors		- The "Bubble model" is over; - Globalization is assisting the young ventures. They can enjoy effective outsourcing such as production outsourcing in low wage countries.

Some additional points regarding VCs

General

- VCs were not sufficiently professional to shut down futile start-ups in time. It is also part of the Israeli mentality not to give up.

The expected value if successful

- Does the company have a good chance to perform a quick exit or of being acquired by a main player (big company)?
- What was the value of similar companies during their "Exit"?

The competitive advantage

A specific and robust advantage for success. What makes the difference creating the advantage that will lead for success?

Appendix no. 8: Summary of the main issues revealed in the interviews

Subject	Issue
Strategy	• Has to be focused around strengths and not carried away by the hype; • Make a clear business plan, construct a plan with short, medium and long-term goals and frequently update the business plan. It should be driven by customer forces and market dynamics; • Know your industry and your market; • Define companies' goals; • Perform SWOT analysis and analyze industry trends, which are very important but difficult to analyze. These include technological trends, application trends and availability of budgets for the new technology/products; • Has to be market-driven and not technology-driven; • Utilize globalization to promote distribution of functions • Should be based on a specific and robust advantage for success.
Core Team	• Must be harmonized and develop cohesion; • High quality diversified and synergetic with experience and expertise in the industry. Look for skills and experience in critical areas: o Management; o Technology; o Business development; o Marketing and sales; o Avoid egocentric people.
CEO (Part of the Core Team)	• CEO is a critical factor in success. He defines the company culture, decides strategy, must be intimately familiar with the industry, proficient and knowledgeable in major areas such as marketing and management and have the capability to execute the plans; • The CEO often hinders the start-up success and with all the difficulties involved should be replaced in time • Does he have a proven record?
Workforce	• Select your employees carefully; • New immigrants can be a real diversifying force multiplier; • It is important to have easy access to a high quality work force.

Management	• Lack of professionalism among the board of directors which mostly includes the investors. It often fails to guide and correct faults.
Marketing	• No clear marketing Strategy which is crucial for success. Business development staff has to identify the opportunities; • Lack of fund allocation creating a non-professional and unstable marketing team; • No market research or initial analysis with no update; • Saturated market with direct and indirect competitors or too limited market; • Find solutions to real needs; • Identify an attractive market niche (big enough for profits and growth but small enough for the big companies); • Israeli companies and products arrive in the market with some inferiority, because of the country's remoteness and due to political reasons. They must therefore excel in technical performance; • Distribution channels have behave differently in diverse geographical areas and need professional backup and support; • The main difficulties relate to new technology (typical of high-tech start-ups) and education of the market. New standards in a conservative industry cause a long diffusion period and require high investments; • Disagreement about main market; • Location of the leading marketing team; • Utilize "field specific" experts (such as an industry expert); • The start-up can very often not achieve leadership but can be acquired on buyer's orders to achieve leadership.
Complete solution	• Must be suitable for all targeted market segments. Is there a real need? Market analysis is done by discussion with potential customers; • Can all parts of the targeted market bear the price? • Be focused (don't develop many products simultaneously); • Think about market expansion by product adaptation. Is the product scalable to enable upgrades, repetitive (binding) sales to current customers and market expansion? • High entry barrier such as unique/superior technology is important (look for a gap of one to two years). Is there a real competitive advantage? • Do not target a too sophisticated solution for market

	penetration. Time to market is important. Seeking a perfect solution results in being late in the market; • Try to analyze proper timing for product launch, especially important when there is a step in technology/breakthrough; • Performance faults due to early introduction or other reasons; • Long penetration time; • Based on OEM strategy while OEMs were not convinced of the product's added value; • Be careful not to annoy the leading companies (your OEM); • Israel is no doubt among the leading countries in technology. It can serve as a very good Beta site to debug technical problems; • Regulated markets are problematic and often need the authorities' approval; • Product strategy changed from product to disposables required for the usage; • Hefty psychological effects; • Refusal of potential customer to take integration responsibility; • The future will lead to "utility consumption" not products
Customer Relations	• Probability of customer's loyalty; • Mind the cultural gaps, "Buddy" in business is Israeli behavior; • Be careful of complex customers with contradicting interests; • Customers need good service.
R&D	• Prevent shortcuts in R&D; • Take advantage of highly skilled manpower in Israel; • Avoid poor communication between R&D and marketing; • Avoid friction between different R&D centers (local and overseas).
Strategic alliance	• International corporations and alliances are very often crucial because of the distance from the market and the difference in culture and approach to business; • Must be done very carefully without loosing main assets; • Very important for "complete solution" in the some fields (such as the medical field).
Funding	• Sometimes very difficult. Often depends on the economy. Waiting too long to raise money can be fatal. Often becomes a major problem and prevents expected success;

	• Avoid big waste of funds; • Lack of marketing/products focus causes high expenses; • Market penetration often requires high budget; • Clusters like Silicon Valley can assist the funding; • Today's funding might be stepwise; • A major consideration of VCs: How much money will the venture require until exit? Some invest if finance required until exit is between $5 to $30 million.
Investors	• Before investing VC should make a good expert evaluation and understand the technology and the decision-makers; • VCs in Israel is a young field. They were not too professional and did not shut down futile start-ups in time. It is also part of the Israeli mentality not to give up. Today VCs are much more professional and experienced; • VCs can bring add value to the board by guidance, can provide contacts in the market and assist in further finance of the venture; • Some experts claim that VCs were motivated by greediness and seeking quick results; • VCs claim they have only business considerations which are the only way to maximize returns. They examine economical parameters such as the value of similar companies during their "Exit"; • The drive for acquisition, often leading to transfer the business essence overseas is driven only by economical reasons; • The VC should strive for minimum involvement in the venture; • An international VC can utilize its international contacts to perform an internationally viewed SWOT analysis while discovering the best global opportunities.
External factors	• Forget the "New Economy" (the "Bubble model" is over); • The Israeli society includes many innovative people; • The army qualifies many youngsters for high-tech activity and enhances creativity and improvisation capacity amongst the younger generation; • Globalization is assisting the young ventures. They can enjoy effective outsourcing such as production outsourcing in low wage countries.

Appendix no. 9: Comparison parameter analysis according to "successful" and "unsuccessful" companies

In order to analyze which parameters belonging to the 15 topics have been ranked differently by "successful" companies versus "unsuccessful" companies, a t-test analysis was performed for the independent samples which comprise the research indices. The results are described in the following tables.

A t-test for independent samples for the parameters comprising the topic "Idea" according to "successful" and "unsuccessful" companies

	Unsuccessful		Successful				
	Mean	SD	Mean	SD	t	df	Sig.
Idea formulation	5.88	1.451	5.67	1.549	.561	60	.577
Idea meeting needs	5.76	1.665	6.50	.697	-2.388*	59	.020
Idea itself	5.35	1.413	6.08	.967	-2.441*	60	.018

(*) $p<0.05$

There is a significant difference between the respondents in two parameters: Idea meeting needs and the Idea topic by itself. The average ranking of "successful" companies in these two parameters was higher than the ranking of "unsuccessful" companies.

A t-test for independent samples for "Strategy" parameters for "successful" and "unsuccessful" companies

	Unsuccessful		Successful				
	Mean	SD	Mean	SD	t	df	Sig.
Mission statement	5.08	1.573	5.36	1.552	-.707	60	.482
Industry analysis	5.69	1.408	6.14	.833	-1.564	60	.123
Strategy clarity	4.85	1.617	5.08	1.422	-.612	60	.543
Strategy update	5.65	1.648	5.78	1.124	-.352	60	.726
Strategy itself	5.68	1.345	6.14	.899	-1.598	59	.115

There are no significant differences between the two groups regarding the topic of "strategy".

A t-test for independent samples for "Core Team Expertise" parameters for "successful" and "unsuccessful" companies

	Unsuccessful		Successful				
	Mean	SD	Mean	SD	t	df	Sig.
Team diversified experience	5.81	1.443	5.86	1.018	-.171	60	.865
Team former experience	4.56	1.417	5.22	1.495	-1.738	59	.087
Team leadership ability	5.88	1.751	6.42	.732	-1.639	60	.106
Consultants	4.85	1.642	5.25	1.360	-1.057	60	.295
Investors contribution	4.50	1.503	4.64	1.437	-.368	60	.714
Core team expertise	5.88	1.424	6.17	.737	-1.028	59	.308

There are no significant differences between the two groups regarding the topic core team expertise.

A t-test for independent samples for "Core Team Commitment" parameters for "successful" and "unsuccessful" companies

	Unsuccessful		Successful				
	Mean	SD	Mean	SD	t	df	Sig.
Core team involvement	6.23	1.336	6.51	.612	-1.111	59	.271
Core team motivation	6.23	1.336	6.69	.631	-1.770	59	.082
Core team total commitment	6.12	1.395	6.57	.558	-1.758	59	.084

There are no significant differences between the two groups regarding "core team commitment".

A t-test for independent samples for "Organization" parameters for "successful" and "unsuccessful" companies

	Unsuccessful		Successful				
	Mean	SD	Mean	SD	t	df	Sig.
Employee responsibility	4.65	1.413	5.31	1.142	-2.007*	60	.049
Organizational levels	4.69	1.761	5.31	1.078	-1.705	59	.093
Organization	4.69	1.436	5.24	1.327	-1.516	58	.135

(*) $p<0.05$

There is a significant difference between the respondents in one parameter: Employee responsibility. In this parameter, the average ranking of "successful" companies was higher than that for "unsuccessful" companies.

A t-test for independent samples for "Marketing Strategy" parameters for "successful" and "unsuccessful" companies

	Unsuccessful		Successful				
	Mean	SD	Mean	SD	t	df	Sig.
Market expertise	5.58	1.501	6.08	1.105	-1.531	60	.131
Marketing plan	6.12	.971	5.78	1.174	1.199	59	.235
Marketing research	4.96	1.536	4.94	1.433	.045	60	.964
Market growth	4.81	1.575	5.34	1.211	-1.501	59	.139
New market standards	4.42	1.653	5.17	1.342	-1.953	60	.056
International market penetration	5.42	1.447	5.86	1.199	-1.301	60	.198
Market dynamics	5.58	1.501	5.78	1.245	-.575	60	.568
Patents registration	4.92	1.958	5.60	1.666	-1.456	59	.151
Perceived utility	5.96	1.685	6.47	.654	-1.658	60	.103
Distribution channels	4.15	1.759	4.63	1.352	-1.192	59	.238
Product positioning	4.81	1.767	5.89	1.022	-3.001**	59	.004
Marketing R&D Relationship	5.77	1.531	5.97	1.183	-.589	60	.558
Main Market Penetration	5.24	1.809	6.11	.758	-2.567*	58	.013
Marketing Strategy	5.96	1.574	6.28	.779	-1.044	58	.301

(**) $p<0.01$; (*) $p<0.05$

There is a significant difference between the respondents in two parameters and in one parameter a difference which is almost significant: Product positioning, main market penetration and new market standards. In all three parameters the average ranking of "successful" companies was higher that the ranking of "unsuccessful" companies.

A t-test for independent samples for "Customer Relationships" parameters for "successful" and "unsuccessful" companies

	Unsuccessful		Successful				
	Mean	SD	Mean	SD	t	df	Sig.
Customer needs	5.69	1.644	6.31	.856	-1.912	60	.061
Customer buying behavior	5.81	1.600	6.31	.786	-1.619	60	.111
Customer feedback	5.69	1.619	6.31	.856	-1.933	60	.058
Market receptivity	5.72	1.542	6.17	.985	-1.384	58	.172
Continued sales	5.19	2.000	5.68	1.319	-1.128	58	.264
Customer relationship	5.73	1.538	6.25	.841	-1.706	60	.093

There is a meaningful, but not statistically significant, difference between the respondents in two parameters of customer needs and customer feedback. In these two parameters the average ranking of "successful" companies was higher than that for "unsuccessful" companies.

A t-test for independent samples for "Management" parameters for "successful" and "unsuccessful" companies

	Unsuccessful		Successful				
	Mean	SD	Mean	SD	t	df	Sig.
Management style	4.84	2.014	5.53	1.331	-1.583	57	.119
Team solidarity	5.54	1.726	6.28	.659	-2.350*	60	.022
Employee development	5.19	1.650	5.83	1.043	-1.842	59	.070
Organization management	5.50	1.726	6.25	.841	-2.266*	60	.027

(*) $p<0.05$

There is a significant difference between the respondents in two parameters and in one parameter: Team solidarity, organization management, employee development. For all three parameters the average ranking of "successful" companies was higher than that for "unsuccessful" companies.

A t-test for independent samples for "Networking" parameters for "successful" and "unsuccessful" companies

	Unsuccessful		Successful				
	Mean	SD	Mean	SD	t	df	Sig.
Networking in general	5.16	1.344	5.58	1.173	-1.255	56	.215

There are no significant differences between the two groups regarding the topic "networking".

A t-test for independent samples for "R&D" parameters for "successful" and "unsuccessful" companies

	Unsuccessful		Successful				
	Mean	SD	Mean	SD	t	df	Sig.
Technological manpower availability	5.56	1.325	5.84	1.036	-.884	54	.381
MOD technology and infrastructure	4.08	1.863	4.00	1.844	.165	53	.869
Development team	5.62	1.577	6.06	.924	-1.381	60	.172
Innovation level	5.04	1.744	5.94	.984	-2.582*	59	.012
Technological breakthrough	4.88	1.716	5.36	1.046	-1.360	59	.179
Ease of adaptation	5.36	1.729	5.51	1.147	-.416	58	.679
Product quality and durability	5.73	1.614	6.20	1.079	-1.360	59	.179
Product price	5.12	1.608	5.86	1.167	-2.089*	59	.041
Time to market	5.12	1.904	5.50	1.285	-.933	58	.355
R&D capability	5.46	1.414	6.17	.747	-2.521*	57	.015

(*) $p<0.05$

There is a significant difference between the respondents in three parameters: Innovation level, product price, R&D capability. In all three parameters the average ranking of "successful" companies was higher than that for "unsuccessful" companies.

A t-test for independent samples for "Complete Product" parameters for "successful" and "unsuccessful" companies

	Unsuccessful		Successful				
	Mean	SD	Mean	SD	t	df	Sig.
Independent product	3.75	1.452	5.03	1.354	-3.375**	53	.001
Complete product	4.80	1.979	5.72	1.198	-2.169*	55	.034
Cooperation in R&D	4.92	1.891	5.53	1.279	-1.428	53	.159
Cooperation in marketing	5.46	1.933	5.83	.874	-.950	52	.347
Complete product	4.96	1.814	5.59	1.214	-1.577	55	.121

(**) $p<0.01$; (*) $p<0.05$

There is a significant difference between the respondents in two parameters: Independent product and complete product. In these two parameters the average ranking of "successful" companies was higher than that for "unsuccessful" companies.

A t-test for independent samples for "Type of Funding" parameters for "successful" and "unsuccessful" companies

	Unsuccessful		Successful				
	Mean	SD	Mean	SD	t	df	Sig.
Fund type importance	4.92	1.316	5.35	1.346	-1.227	56	.225

There are no significant differences between the two groups regarding the topic "funding".

A t-test for independent samples for "Political Situation" parameters for "successful" and "unsuccessful" companies

	Unsuccessful		Successful				
	Mean	SD	Mean	SD	t	df	Sig.
Political environment	3.88	1.883	4.50	1.482	-1.417	58	.162
Security situation	3.62	1.920	4.35	1.454	-1.694	58	.096
Political situation	3.62	1.722	4.60	1.288	-2.557*	59	.013

(*) $p<0.05$

There is a significant difference between the respondents in one parameter: Political situation. In this parameter the average ranking of "successful" companies was higher than that for "unsuccessful" companies.

A t-test for independent samples for "General Environment" parameters for "successful" and "unsuccessful" companies

	Unsuccessful		Successful				
	Mean	SD	Mean	SD	t	df	Sig.
Military influence	4.08	1.976	4.68	1.514	-1.263	53	.212
Entrepreneurship education	4.62	1.551	4.92	1.296	-.832	60	.409
Availability of manpower	5.31	1.517	5.70	1.185	-1.107	57	.273
Government support	4.72	1.208	5.06	1.474	-.939	58	.351
Cultural and social norms	4.81	1.524	5.29	1.126	-1.410	59	.164
General environment	4.54	1.272	5.14	1.192	-1.903	59	.062

There is an insignificant difference between the respondents in one parameter: General environment, in which the average ranking of "successful" companies was higher than that of "unsuccessful" companies.

A t-test for independent samples for "Economy" parameters for "successful" and "unsuccessful" companies

	Unsuccessful		Successful				
	Mean	SD	Mean	SD	t	df	Sig.
World economy	5.23	1.657	5.75	1.131	-1.468	60	.147
Local economy	4.29	1.876	4.89	1.526	-1.354	58	.181
Funds availability	5.65	1.384	5.83	1.207	-.543	60	.589
General economy	5.08	1.164	5.49	1.401	-1.209	59	.231

There are no significant differences between the two groups regarding the topic "Economy".

Appendix no. 10: the results of the validation process

The tables below show the results of the 16 valid responses to the research model validation process. They show the score of the different quartiles and the median and mean score of each topic.

		Core Team EXPERTISE 1	Core team COMMITMENT 2	IDEA 3	STRAREGY 4	MARKETING 5
N	Valid	16	16	16	16	16
	Missing	0	0	0	0	0
Mean		3.06	3.63	2.63	4.94	5.00
Median		2.00	4.00	2.50	4.00	5.00
Mode		2	4	1	4	6
Percentiles	25	1.00	2.00	1.00	2.25	3.25
	50	2.00	4.00	2.50	4.00	5.00
	75	3.00	4.75	3.75	6.50	6.00

a multiple modes exist. The smallest value is shown

		CUSTOMER 6	MANAGEMENT 7	DEVELOPMENT 8	NETWORKING 9	FUND-TYPE 10
N	Valid	16	16	16	16	16
	Missing	0	0	0	0	0
Mean		6.81	4.94	7.94	10.31	9.75
Median		7.00	5.00	8.00	11.00	10.00
Mode		7	5(a)	8	9(a)	9(a)
Percentiles	25	5.00	3.25	9.00	9.00	8.00
	50	7.00	5.00	11.00	10.00	8.00
	75	7.75	6.00	12.00	11.75	8.00

a multiple modes exist. The smallest value is shown

		ECONOMY 11	COMPL. PRODUCT 12	ORGANIZATION 13	ENVIRONMENT 14	POLITICS 15
N	Valid	16	16	16	16	16
	Missing	0	0	0	0	0
Mean		11.13	10.63	11.88	12.88	14.50
Median		11.50	10.00	12.00	14.00	15.00
Mode		13	10	11(a)	14	15
Percentiles	25	9.25	10.00	11.00	12.25	14.25
	50	11.50	10.00	12.00	14.00	15.00
	75	13.00	11.75	13.00	14.00	15.00

a multiple modes exist. The smallest value is shown